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COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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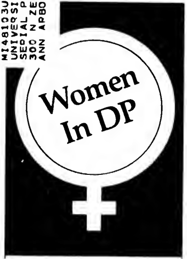

Debug Views On DP Careers, Women Urged

By Marcia Blumenthal
CW Staff

ANAHEIM, Calif. – Women aspiring to the managerial stratosphere of the computer industry have some special career debugging to do before they can make the leap from technical staff to the executive suite.

Along the way, women will have to find mentors and emulate the dress of the top executives within their companies. In addition, females pursuing managerial careers must avoid overspecialization in one technical area and learn to take risks.

This was some of the "nuts and bolts" advice given during a session on careers for women in the computer industry at the recent National Computer Conference here.

Panel leader Thelma Estrin of the University of California at Los Angeles said that women must consciously develop strategic plans for their career paths, rather than rely on circumstances to propel them. Career planning forces self-awareness, she said.

A special problem faced by women in all industry, according to Estrin, is the lack of role models – females who have attained positions of authority within the corporate structure.

Because there are so few female executives, women must consciously choose a mentor – usually a male. This should be done at the beginning of a woman's career, Estrin said, and the mentor should not necessarily be her immediate supervisor.

Carolyn Morris, now a sales manager for general systems at Hewlett-Packard Co., chose her mentor after

(Continued on Page 4)

View on Proposition 13:

Local DP Can't Take Budget Cuts

By Brad Schultz
CW Staff

IRVINE, Calif. – While the full impact of California's tax limit initiative – the controversial Proposition 13, or Jarvis Bill – will not be known for some time, the measure could spark local government budget slashing in many states.

And what better area to cut than DP?

Not so, according to a University of California computer science professor here. Administrators looking for items to trim may find DP budgets difficult targets since even a slight reduction in funding for a typical municipal or county DP operation would have a devastating impact on its ability to support current systems, he said.

A slight budget cut on an average local government DP facility might render the facility's computer systems nearly useless since they could not then be adequately maintained or developed, Prof. Rob Kling of the University of California at Irvine (UCI) said here last week.

Moreover, computer systems are generally inelastic, Kling said, explaining that "systems do not shrink" and cannot easily be diminished in terms of physical size, power consumption or overhead.

In contrast, there is far more elasticity in most other local government operations, such as schools or public works, he continued. Schools can survive radical cuts in expenditures by simply eliminating certain programs and courses, he said, adding that many local agencies will not be crippled by worker layoffs which reduce payrolls.

With his colleagues at UCI's Public Policy Research Organization (PPRO), Kling has studied the nature of DP facilities and personnel in the public and private sectors. He has found that gov-

(Continued on Page 4)

Routine DP Audit Uncovers $289,000 Welfare Fraud

By Ann Dooley
CW Staff

LOS ANGELES – A recent, routine computer audit alerted officials here to the largest welfare fraud uncovered in this county to date – a woman who allegedly claimed benefits under 10 different names for herself and a total of 47 children.

The woman, Barbara Williams, alias Barbara Jean Thompson, turned herself in last week after news of the scheme was broadcast nationwide. Williams stole $289,000 in welfare payments over a seven-year period using forged documents including birth certificates, Social Security numbers and driver licenses, Los Angeles County Department of Public Social Service officials charged.

The 33-year-old Williams, who has four children, listed as many as nine children as dependents in several of her welfare claims, according to authorities. She used the forged documents to qualify for Aid to Families with Dependent Children (AFDC) and food stamps at 10 welfare offices in the county, officials said.

While engaged in the scheme, Williams was living in a well-furnished home in an affluent area, according to Michael Connors, director of the Welfare Fraud Prevention and Investigations Department. She had Cadillac, Porsche and Ford automobiles, he said.

Williams' property will be seized and any savings accounts will be traced

(Continued on Page 8)

ACM on Ansi Flowcharts: Examine the Alternatives

By Don Leavitt
CW Staff

NEW YORK – The "ubiquitous ignoring and rejecting" of the current American National Standards Institute (Ansi) specifications for flowcharts means that advocating a minor or cosmetic revision of that standard "would be worse than pointless," according to a review committee sponsored by the Association for Computing Machinery (ACM).

Instead of dressing up a standard geared to old flowcharting techniques, the committee urged a "careful, independent, comparative examination" of the documentation alternatives, especially some that have come into widespread use in the past years.

In its report to ACM's Standards Committee, the flowchart committee recommended a study "in greater depth than can reasonably be expected of a volunteer committee [which] might be appropriately funded by the American Federation of Information Processing Societies (Afips).

"This, however, might be regarded as setting an undesirable precedent," the report continued without further explanation. "In that case, the study might be done using the U.S. government's Federal Information Processing Standard Publication 24 as its nominal take-off point and the National Bureau of Standards [as a] possible funding agency."

If such a study is not undertaken, the committee recommended a serious "updating and clarification" of the existing standard, formally known as X3 5-1970. The ACM unit spelled out 26 areas that need attention if such a revision is to have any merit.

But the recommendation to upgrade the standard was made "reluctantly,"

(Continued on Page 8)

Draft Communications Bill Doesn't Cover Every Base

Ronald A. Frank
CW Staff

WASHINGTON, D.C. – The rewrite of the Communications Act of 1934 proposed by the House Subcommittee on Communications may be more important in what it does not state than in what it specifically defines.

Most industry experts contacted a week after the legislation, known as the Communications Act of 1978, was introduced, said the 200-page document was being carefully studied to determine its impact. Although described by committee chairman Lionel Van Deerlin (D-Calif.) as a complete revision, regulatory experts point out that it is by no means a one-for-one replacement for the Communications Act of 1934.

While the rewrite has been called deregulatory in nature, many areas now under the jurisdiction of the Federal Communications Commission (FCC) are not addressed in the proposed act. This raises the questions, according to one knowledgeable source, of whether the rewrite is actually a superficial document "thrown out" for fine tuning during the upcoming hearings on the bill.

Analysis

The legislation would supposedly free AT&T from the constraints of the

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Debating 81 Instructions

Jury Out in Memorex vs. IBM Case

By Catherine Arnst
CW Staff

SAN FRANCISCO — The decision in the Memorex Corp. vs. IBM antitrust case is being debated behind closed doors here by 11 jurors, while lawyers for both sides wait nervously in nearby offices.

For a week now, the 11 jurors have been poring over the 20,000-page transcript of the case in an attempt to determine whether Memorex has proven that IBM monopolized the computer systems market and its submarkets.

The most crucial determination for the jury will be the answer to that question, for if it finds IBM is a monopoly, it will have to apply different standards to IBM's behavior than it would to other computer manufacturers' behavior, Judge Samuel Conti told the jury in his instructions.

IBM, of course, argues that it is not a monopoly, in which case the practices and actions Memorex has attributed to it were just necessary business practices in a highly competitive industry.

Five days of closing arguments capped the six-month-long case before the jury retired to make its decision, which could come at any time now.

Memorex attorney John Endicott read his closing argument from a notebook the size of the San Francisco telephone book. The lengthy argument was needed, in part, to explain the complex decision process through which the jury of 11 men and women have to go. The jurors must cover 81 instructions from the judge.

In order to prevail, Memorex must prove three claims to the jury's satisfaction: that IBM possessed monopoly power in a relevant market or submarket; that IBM willfully acquired or maintained that monopoly power rather than earn it as a consequence of a superior product, business acumen or historical accident; and that Memorex was injured or damaged in its business or property as a result of IBM's conduct.

Damage Claims

If the jury decides all these claims in Memorex's favor, then it must assess damages. Memorex is asking for $306,580,000 in damages based on the losses it claims it suffered in the products it attempted to market to compete with IBM's product line.

Memorex claimed a loss of $50,675,000 in its attempt to compete with the IBM 650 disk drive; $48,837,000 in the case of the 3670 disk drive; $27,156,000 for the 660 disk control units; $36,291,000 for the 3671 and 3672 disk control units; and $50,737,000 for the 1270 communications control unit. Memorex also claims a $97,884,000 loss in the computer systems market which the firm also tried to enter.

These figures were based on calculations of both the amount spent on development and production of the products and the loss of profits from the products Memorex expected to sell but never did because of IBM's alleged monopoly, Endicott said.

According to law, the court is not allowed to tell the jury that any damages awarded to Memorex would be tripled.

Endicott emphasized that "everybody is doing it" is not a defense in antitrust actions and, although IBM may have been doing what everyone else was doing, according to Conti's instructions, "a firm which possesses monopoly power may be precluded from employing otherwise lawful practices which have the effect of unnecessarily excluding competition from the market or submarket."

IBM attorney Patrick Lynch spoke for almost as long as Endicott, but didn't use notes. He used analogies liberally, however, and at various points during his closing argument compared issues in the case to sporting events and to buying a new car, a stereo system, peaches and soft drinks.

Lynch argued that all the actions Memorex accused IBM of taking for anticompetitive reasons were in actuality only taken to remain in the running in a highly competitive market. Product innovations and price cuts which are at issue in this lawsuit always ultimately benefited the consumer, either by advancing the state of the art, increasing capabilities or lowering prices, he said.

Memorex was trying to ensnare IBM in a "Catch-22," Lynch said. For example, it accused IBM of creating a barrier to entry when it offered short-term leases, locking in users and lowering prices unfairly when it offered long-term leases and avoiding competitive pressures when it offered equipment for direct sale, he said.

Both parties spent a great deal of time on market definition and market measurement, for if Memorex fails to prove that IBM controlled the lion's share of the relevant market, then it will have failed to clear the first hurdle.

Memorex claims IBM monopolized approximately 70% of the general-purpose computer systems market, which includes peripheral devices as a submarket. IBM claims the electronic data processing market is actually the relevant market and estimates that it has only one-third of that market.

However, Conti has allowed the jury to consider power in a submarket as a valid measure of monopoly power, and even an IBM expert witness testified that the general-purpose computer systems market is a part of the general-purpose DP market. That could qualify it for submarket status in the jury's mind even if it accepts the larger market definition IBM claims.

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13	Atlantic Richfield
14	Shell Oil
15	U.S. Steel
16	E. I. du Pont de Nemours
17	Continental Oil
18	Western Electric
19	Tenneco
20	Procter & Gamble
21	Union Carbide
22	Goodyear Tire & Rubber
23	Sun
24	Phillips Petroleum
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27	Occidental Petroleum
28	International Harvester
29	Eastman Kodak
30	RCA
31	Rockwell International
32	Caterpillar Tractor
33	Union Oil of California
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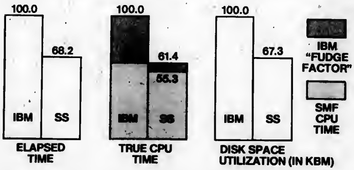

If that's the case, why doesn't everyone sort with SyncSort? Frankly, we don't know. That's the biggest puzzle of all.

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CRTs 'Like Truth Serum' in Housing Courts

By Marguerite Zientara
CW Staff

NEW YORK — A computerized information system in New York City's housing courts "has been like a truth serum," according to one of its developers.

Housing judges in Queens, Manhattan and the Bronx now have CRTs on their benches and can retrieve information in seconds on violations and related matters concerning about 1,999,000 housing units, according to Bruce J. Gould, staff associate at the Community Service Society, a nonprofit organization that studied delays in the housing courts and developed the system.

The primary goal of the system, Gould said, is to see that buildings are maintained in good condition. Since most of the cases in the housing courts stem from landlords suing tenants for rent, the computerized system indicates immediately whether a tenant has legitimate reasons for withholding rent.

Data for Judges

Information furnished to the judges includes an overall description of the building in question; its street address, number of units and number of floors; the name and address of the owner and managing agent; the status of real property tax payments; the number of complaints against the building; and any violations uncovered in inspections by the Code Enforcement Agency.

The name and address of the complainant, the date the complaint was registered and any action taken can also be called up on the CRT.

In addition, New York's Emergency Repair Program enables repairs to be made to a building by the city, reimbursable by the owner. The CRT indicates the monetary balance of this program and details the type of repairs on which the money was spent.

The system also indicates when a violation was first noted, when an item was scheduled for reinspection and whether it was reinspected. The violation is classified as "ordinary," "hazardous" or "imminently dangerous," Gould said.

The system is linked to the records of the city's Department of Housing Preservation and Development.

"With such instant information, judges can get a better picture of a landlord and thus can make quick judgments. The system has changed the nature of testimony in court," Gould said.

The system runs on an IBM 370/148 and costs $8,000/mo for maintenance, he added. Now being financed by Federal Community Development funds, it was initiated under a grant from the New York Community Trust.

In Manhattan, the equipment includes seven IBM 3277 CRTs and one 3288 printer. In the Bronx, seven AT&T Dataspeed 40 CRTs and a Dataspeed 40 printer are used. Queens uses three Dataspeed 40 CRTs and one printer.

Gould said the system is not saving "enough money to mention." What money is saved is derived from eliminating the need to subpoena documents and records for the court since all data is now accessible via CRT.

Moneymaking Plans

The purpose of the system, in Gould's view, is "to *make* money because we'll be able to collect money owed the city for housing matters by having the evidence at the judges' fingertips. We'll be able to collect penalties levied for noncompliance with the law, and we'll recoup funds from the Emergency Repair Program."

Pending is a plan to sell computer printouts in the courthouse to "promote information on the buildings in the city and encourage litigants to act."

The system started In Manhattan in October 1976; Queens joined In December 1977 and Brooklyn will join this month.

Before the system was implemented, Gould drafted a bill which became law stipulating that all information on the judge's CRT screens would be considered prima facie evidence "so there would be no fights about the evidenciary value of the information."

Women Advised on Entering Management

(Continued from Page 1)

she had been with HP only a few weeks. Describing the incident, she recalled walking up to a vice-president she admired, introducing herself and telling him she was interested in learning more about the company.

Technical Competence

Besides selecting a mentor, women seeking entry into management in the computer industry must develop technical competence. This is one of the few industries, the panelists agreed, that requires thorough technical knowledge in some particular area. Therefore, any prolonged absence from the profession hinders career development, Estrin noted.

However, Estrin warned that women should not fall into the trap of becoming overspecialized. "Women feel they have to be super technicians" and tend to avoid taking the risk to move up "without complete knowledge of a technical area. Women must learn to let go of technological concerns if they are to succeed in management," Estrin commented.

Nomi Guillen-Williams, manager of systems design for Control Data Corp., also emphasized the risk of getting locked into a specialty. She suggested developing generalist skills by taking on the management of a project within the company.

Drawing from her speciality, software, Guillen-Williams urged women to take the opportunity to work on various software projects. Software is a much easier base from which to penetrate the managerial ranks than hardware, she claimed.

As part of career planning, Guillen-Williams advised women to make sure their companies have top-management-supported affirmative action programs. If the company doesn't have the commitment of the top executives to promote women to managerial levels, then get out your resume, she suggested.

HP's Morris stressed that to advance her career, a woman must change her image from that of a technician to that of a manager — a person who can coordinate business functions, not just technical projects. To do this, a woman may have to change companies, Morris said.

Morris moved to HP and sales because, "After you've seen one operating system, you've seen them all," she said.

Authority Image

Developing an image of authority is particularly important in the hardware sector of the industry, according to Dr. Donnamarie E. White, manager of the education department of Advanced Micro Devices, Inc. "In hardware," she stated succinctly, "men do not take women seriously."

Clothing plays a large part in building an authority image, White stressed. Wear neutral-colored skirted suits with the length just below the knee, she advised. Most importantly, observe how the top executives in the company dress and emulate them.

Avoid wearing heavy makeup and jewelry and don't carry a purse. "In other words," White continued, "avoid appearing feminine, with one exception — always wear a wedding ring, even if you are single."

The highly tailored White later admitted she designs clothes as a hobby and enjoys flamboyant styles. She said she used to wear her designs to work until she realized her clothes were an obstacle to moving into the executive suite.

White urged women to read "how-to" books. She suggested, among others, *The New Executive Woman* by Marcia Williams and *The Woman's Dress For Success Book* by John T. Malloy.

Crowding around the speakers after the session, the women attendees seemed eager to learn more of the experiences of these managers who have succeeded in reaching the industry's executive levels.

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Local DP 'Taxed' Already

(Continued from Page 1)

ernment DP centers usually handle more kinds of applications and more complex kinds of data than do industry centers.

Since the demand for technical expertise at a facility rises with the diversity and complexity of that facility's activity, the effects of DP budget cuts are more severe in government than in private industry, Kling said.

Explaining why DP tends to be more "intensive" in government than In private industry, Kling pointed out that accounting tasks can be especially convoluted in the public sector since program funding there can often have many sources, requiring more elaborate audit trailing.

Whether or not DP budget cuts are made in local government, the financial support for public DP is already poor in most cases, Kling said. Even local government DP salaries are not competitive with private industry.

One reason for this situation is that non-DP department heads who supervise DP personnel might find themselves earning less than their subordinates if DP salaries were competitive with industry, he continued.

Because salaries are not competitive, city and county DP jobs are typically taken by recent college graduates who leave for the private sector after about three years, Kling said. As a result, local governments are already deficient in the experienced personnel usually needed to develop sophisticated software, he explained. However, elaborate systems are occasionally created by "whiz kids" and left in the lurch when the creators depart, he added.

Many local governments now anticipate severe budget cuts although they have committed themselves to significant computer system development well into the future, Kling said, indicating these cities and counties have "crossed the Rubicon" and cannot revoke development plans before the cuts take effect.

For Data Security Device

Commerce Lifts Secrecy Order on Patent Bid

By Howard A. Karten
CW Staff

WASHINGTON — In an on-again, off-again move, officials of the U.S. Patent Office have reversed their recently imposed secrecy order on a patent application relating to computer security. The decision, which came in the wake of national news coverage of the story, reversed the Patent Office's earlier finding that disclosure or dissemination of the application by a University of Wisconsin-Milwaukee professor could harm the national security.

The patent application, which resulted from research funded by the National Science Foundation (NSF), is believed to be related to data encryption and a device that would perform that security function. George I. Davida, the associate professor of electrical engineering and computer sciences who applied for the patent, was unwilling to discuss any aspects of the case pending official notification that the order had been rescinded.

Last December, Davida, then a graduate student at the school, was awarded an $89,728 grant by the National Science Foundation to fund his research. Davida subsequently applied for a patent on the project and on April 21, the patent office imposed the secrecy order on the patent application.

Neil Kalishman, a patent lawyer contacted by *Computerworld*, explained that the Patent Office, an agency of the U.S. Department of Commerce, screens all patent applications for possible defense or national security implications.

Commerce Department officials also refused comment on the reversal, saying that discussion of pending applications is prohibited by federal law.

A Patent Office division called Group 220 refers any patents that it thinks might fall into this category to the Pentagon, which then examines them in further detail.

Kalishman, who practices patent law in Clayton, Mo., explained that under U.S. law, the Commissioner of Patents is required to withhold the issuance of a patent if, in his opinion, disclosing patent information would be detrimental to the national security. The Patent Commissioner is also required to notify defense agencies in such cases, and those agencies then make the actual determination about security.

In 1970, during the Vietnam war, the mathematics building on the Madison campus of the university was bombed. In the aftermath, several University of Wisconsin campuses adopted policies barring classified research. Davida was involved in university-funded, unclassified research.

Commenting on the lifting of the order, Frank A. Cassell, assistant chancellor for university relations, said, "our first concern has always been Prof. Davida and that he be allowed to continue with his research. We're very pleased that the government has withdrawn the secrecy order. We would also want to say, however, that we still believe there were very fundamental issues involved in this case, and those issues have not been resolved by the withdrawal of the secrecy order."

Although U.S. regulations provide for a judicial mechanism for challenging such secrecy orders, this method was not used in this case. An appeal was under way at Wisconsin, but was never filed. The only action taken to try to reverse the secrecy order, Cassell continued, was an attempt by Werner A. Baum, chancellor of the Milwaukee campus, to enlist the aid of Richard C. Atkinson, NSF director.

Role of Kreps

Cassell speculated that Commerce Secretary Juanita Kreps played an important role in the action. He said Kreps, a former vice-president of Duke University, was in touch with Baum recently and reportedly said she would "look into" the issue and hoped it could be favorably resolved. Cassell added that the conversation between Kreps and Baum "gave us some reason to think she was involving herself personally in this."

However, Homer Moyer, Commerce deputy general counsel, denied any involvement by Kreps. Claiming that the timing of Kreps' conversation with Baum and the lifting of the ban were coincidental, Moyer said the defense agency involved reversed its original request for secrecy. Moyer refused to identify that agency, however, claiming it was not a matter of public record in any case and was not Commerce policy to identify the agencies.

The fact that Davida's work was done under an NSF grant is of no significance to the case, Cassell stated.

Commenting on the lessons to be learned from the incident, Cassell said, "Universities and scientists have to be constantly alert to efforts by the government to interfere with or intrude in the process of open research. These efforts circumscribe the principle of academic freedom . . . I would guess the massive national publicity in this case had something to do with the government withdrawing the order, even though an appeal had never been filed."

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Firearm-Tracking Proposal Meeting Opposition

By Ann Dooley
CW Staff

WASHINGTON, D.C. — A computerized system proposed for tracking the distribution of firearms by licensed dealers, manufacturers and importers — but not individual owners — is meeting with stiff resistence from citizens, legislators here and the three groups of licensees.

The system, proposed by the U.S. Treasury Department's Bureau of Alcohol, Tobacco and Firearms (ATF), is not a gun registration or control system, according to Jim Hunt, ATF research and regulations coordinator for the project, who emphasized individual gun owners would not be affected.

The computerized information would be used to trace the distribution of guns in this country and to aid in tracking firearms thefts, he explained.

None of this information is currently at the disposal of the ATF bureau from any centralized system, Hunt said. The ATF performs nearly 60,000 traces each year, but only on a manual basis.

For this reason, there is no way of getting an overall picture of trends or general activities, he added.

Right now, if a dealer orders 5,000 guns, that information is unavailable. With the computerized system, it would be possible to chart overall distribution trends as well as devote more investigation time to dealers with high volumes or an unusual trade flow, Hunt said.

But the public appears to be opposed to this kind of a system, he noted. The ATF is required to ask for citizen opinions before such a proposal can be implemented, and the response so far has been 30-1 against the idea.

Further, the U.S. House of Representatives recently voted to cut the bureau's budget; if the proposal were to be accepted, ATF would not have immediately available funds, to set it up.

Under the proposed system, AFT would require quarterly reports from licensed gun manufacturers that would include a serial number unique to the licensee and to each firearm. The number would consist of 14 characters signifying the manufacturer or importer, the year of import, the firearm model, its caliber or gauge and the serialized numerals of the model produced or imported.

This serial number would standardize the information appearing on all firearms, Hunt said, and would be easily recognizable to police or licensees. The information could be put on existing systems available within the Tresury Department, he added.

In addition to the quarterly reports of transaction and distribution flow, which would be maintained off-line, the system would be used in theft reporting, he said. ATF would use the serial numbers to access the Federal Bureau of Investigation's National Crime Information Center (NCIC) via existing terminals about any firearm thefts.

The firearms would be entered by serial number into the NCIC system. If an individual were picked up after crossing a state line with a stolen firearm, the police could check the NCIC file and determine the licensee from which the firearm was stolen, Hunt explained.

Fear of Gun Control

Although the system would only cover licensed dealers, manufacturers and importers of firearms, a private citizen could participate if he wished, Hunt noted.. But most of the letters Hunt has received about the proposal are against the idea because many people feel it is the first step toward gun control, he said.

Other opponents don't want any further computerization and some don't want any new programs created because of inflationary costs, he said.

Legislators oppose the idea because of the strong gun control lobby which influences the constituents they represent, he said, and dealers are against it because they don't want to fill out any more reports or have any kind of gun regulation.

Manufacturers oppose the proposal because it would mean changing their individual serial numbers to a standardized format, and the importers are opposed because they already are required to provide so much information that they don't want any more paperwork, Hunt said.

June 30 is the deadline for comments on the proposed system. After that, an administrative decision will be made on whether to continue with the proposal.

The proposal could be withdrawn, implemented, partially implemented or held in abeyance, Hunt said.

Draft Communications Act Leaves Gaps

(Continued from Page 1)

1956 Consent Decree, which limits it to providing only telephone services. Instead, Bell would be allowed to offer services which are determined to be "telecommunications or incidental to telecommunications . . ."

The Communications Regulatory Commission (CRC), which would replace the FCC, would decide which services fall into this category. But it is not clear whether DP services would qualify as "incidental to telecommunications."

The basic issue of defining a boundary between computers and communications, which is being addressed by the second Computer Inquiry, now pending before the FCC, would have to be answered before one could determine if AT&T were allowed into the DP area, one source said.

The new act does not define "noncompetitive," according to one attorney, but more importantly, it makes no statement about any arm's-length dealings a carrier would have with a nonregulated subsidiary to prevent cross-subsidization.

One of the arguments of anti-AT&T forces in the past has been that Bell has the ability to use revenue from monopoly services to keep the cost of services that are subject to competition at artificially low levels. The legislation would have to guard against carrier subsidiaries in nonregulated areas being subsidized if there is to be fair competition, the attorney added.

A staff source with the Communications Subcommittee agreed that the CRC would have to decide what services are incidental to telecommunications, but the intent is to open up competition in as broad an area as possible. On the question of subsidies, separate nonregulated subsidiaries would not be able to get the benefit of carrier revenues strictly based on normal accounting practices and the intent is definitely that they operate at arms' length, the source said.

Most observers agree that the emphasis on allowing competition is a positive aspect. "This bill recognizes that competition and diversity of suppliers is the only way to go," according to William McGowan, chairman of the board at MCI Telecommunications Corp.

McGowan said he is not sure that Bell would want to offer DP terminals through an independent subsidiary, as the act apparently would allow. He reasons that after having divested itself of Western Electric Co., the phone company would be nothing more than a distributor of terminals and it may not find this an appealing prospect.

Despite Bell's future position, the legislation seems to mandate complete deregulation of all terminal equipment through separate subsidiaries or any other suppliers, he added.

The establishment of a Universal Service Compensation Fund based on access charges levied on carriers such as MCI for using local exchange facilities would be reasonable so long as the "payment were reflective of the actual cost." An additional charge over and above the cost of providing the facilities could be levied only for "social reasons" such as bringing service to outlying areas. If this were administered by the CRC instead of the telephone company, then "we are certainly in agreement with that," McGowan added.

Giant New Competitor

This bill raises the real possibility that both the DP and interconnect suppliers will have to deal with a giant new competitor called Western Electric, according to regulatory attorney Terry Mahn, who added that it will probably be three years before legislation this broad can be finalized. It is also probable that if Western Electric is spun off, Teletype Corp. would remain as part of the nonregulated company. Teletype has been building a field force and introducing DP-type terminals, perhaps in anticipation of a forced divestiture.

"This is a great opportunity for the telephone companies to expand beyond the phone industry into the teleprocessing business. The net result is a tremendous shot in the arm for the carriers, who can now get into the computer business, according to Charles Johnson, president of General Datacomm Industries, Inc.

But the independent suppliers now have the lead in introducing new technology and there is no reason why they can't maintain this leadership, Johnson said.

Following the bill's introduction, an AT&T spokesman said, "We welcome the bill's declared intent to assure that where competition prevails, it be full and fair competition. On the other hand, there is one provision [the divestiture of Western Electric] that would, in our view, clearly impair the Bell System's ability to serve the public."

One industry source commented that AT&T itself was probably more responsible for the rewrite than anyone else. If Bell had not first proposed the Consumer Communications Reform Act in Congress, the legislative spotlight might never have been cast on the telecommunications industry, he said.

Most industry groups affected by the bill have requested time to participate in its upcoming hearings, scheduled to begin in July. It is not know how much support the proposed legislation has among other members of Congress.

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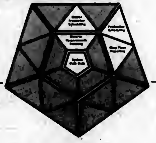

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Informal Access to Bank Records Allowed

Congressman Assails Justice's Privacy Proposals

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — A U.S. congressman has sharply criticized the Justice Department for its proposed legislation to protect the privacy of bank records.

Rep. Peter H. Kostmayer (D.-Pa.) said at a hearing here recently that the proposed legislation "is an effort on the part of the federal government to know more than it is entitled to know about the people of this country."

The Justice Department's proposal would not stop "informal access" to individual's financial data by such agencies as the Federal Bureau of Investigation, the tax and civil rights divisions of the Justice Department and the Drug Enforcement Administration, Deputy Attorney General Benjamin R. Civiletti testified before the House Subcommittee on Government Information and Individual Rights.

'Revolutionary' Rights

Civiletti did agree that since an individual's life can be completely reconstructed from cancelled checks, some protection against abuse is needed. But he called the individual rights proposed in some privacy bills now before Congress "revolutionary" and maintained privacy protection should not be extended to telephone and credit card records.

"Personal records are the lifeblood of successful investigations of sophisticated crimes and our access to them should not be unduly hampered," Civiletti argued.

"You speak of revolutionary legal rights," Kostmayer responded. "That is exactly what they are. That is why they are so precious, why they must be preserved and why we must stand so diligently against the Department of Justice in this administration or any other administration which continually tries to erode the rights and liberties of the American people."

The Justice Department drafted its proposed financial privacy laws in response to bills put forward in the Senate and to the omnibus privacy proposal, H.R. 10076, in the House.

The Justice Department would like to see informal access to bank records formalized by requiring the investigating agency to request the financial record of an individual in writing to the institution holding the desired information, Civiletti said.

Effective law enforcement demands a waiver of legislative provisions that individuals be notified of the government's interest in their bank records in an emergency situation — such as a kidnapping — or when "notice" will give an indivudual time to go into hiding or to destroy evidence, the deputy attorney general said.

The need for speedy access to financial records in many investigations therefore prompted the Justice Department to recommend that individuals be required to challenge a government request for their records within seven days rather than the 18 days provided in H.R. 10076. Courts, too, should be forced by law to deal with these challenges quickly and immediate appeals should be prevented, he suggested.

In order to avoid "frivolous" challenges to the government's efforts to inspect financial records, individuals should be required to file a formal motion in court, Civiletti stated. He flatly opposed Kostmayer's statement that challenges should be as easy as possible and agreed a citizen would probably need an attorney if the government's interests in his records were challenged.

"You are suggesting that despite whatever lawful basis the government has to investigate and prosecute crimes, if some citizen, wrongdoer or not, says, 'I don't want the government to look at my records,' the government then is forced through a laborious process of delays, showings, costs and expenses with an appeal process Civiletti asked.

"Absolutely," Kostmayer replied.

Originally, the Justice Department legislation exempted federal grand juries, foreign intelligence investigations and Secret Service operations from the constraints imposed by financial privacy laws. But during the hearings, Civiletti made some concessions, agreeing the Secret Service should apply to a court for permission to examine an individual's records, for example.

Also testifying at the hearing, former Privacy Protection Study Commission Chairman David Linowes argued that grand juries should not be exempt from privacy laws and that individuals should be informed of the reasons for government examination of their records.

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Security Should Cover Crime, Accident: Parker

By Edith Holmes
CW Staff

ANAHEIM, Calif. — DP and security managers must learn that the safeguards they institute to protect their installations against accidental threats — errors and omissions in programs or system design — won't stave off attacks by the computer criminal, Donn B. Parker of SRI International said at the recent National Computer Conference here.

By defining the weakest link in the computer system and taking steps to protect that part of the installation from intentional acts, however, DP and security managers can reduce the chance of loss or harm — deliberate or accidental — across the entire DP operation, Parker told attendees at a session on computer crime.

One of the reasons the industry has so much trouble with security is its insistence on dealing with accidental losses and losses from intentional acts in the same way. These problems are different and should be treated separately by managers, Parker stressed.

The researchers noted that errors and omissions tend to be single, isolated acts by a person acting alone. A DP manager can rely on the safeguards he institutes to succeed in protecting the installation from many of the losses caused by errors.

The intentional act against an installation is a completely different animal, according to Parker. Such acts are often complex, they frequently involve collusion, the motives for them are complicated and maximum DP skills are used. The computer crime is characterized by large, undetected losses; a low incidence; a game strategy; and attacks on the system's weakest links — where the risks to a computer criminal are minimal and the paybacks are greatest.

Parker suggested to his audience that the best way to measure the vulnerability of a DP system is to define its weakest links. Where a DP operation is weakest will depend on the skills and abilities of the employees who have access to and work with the installation, he said. These weak spots will also depend on how much the organization will lose if those parts of the system are compromised.

While the probability of an accidental loss is the simple sum of the separate probabilities that specific errors and omissions will occur, the probability of a loss resulting from an intentional act equals the maximum chance of loss at the system's weakest link, Parker stated.

Dealing With Losses

DP and security managers can deal with both kinds of acts and the losses resulting from them by identifying the most probable intentional act — the system's weakest link, he said. The next step in this "idealized safeguard strategy" is to select protections for the system that will reduce the chance of a compromise of the weakest link.

Parker would then have managers identify the accidental acts that would be minimized by these safeguards.

These three steps should be repeated until the probability of intentionally caused loss is acceptably low, Parker said. If the DP manager believes the chances for accidental loss are still too high, additional safeguards should be selected that will reduce this kind of loss to an acceptable level, he stated.

Parker gave the audience a sample of the differences between dealing with accidental and intentional acts by discussing two approaches to password access control in an on-line, multi-access system.

To minimize accidental loss, a manager would simply install a minimal length, conveniently remembered password access system, he said.

The safeguards become much more elaborate, however, when the aim is to protect the system from the computer criminal. Now, the passwords selected must be of sufficient length to eliminate guessing. The system will require random password generation and assignment, Parker said.

Managers should record and verify password use periodically to avoid password theft or unauthorized use. Patterns of password use and failed access attempts should be analyzed for deviations from normal experience to detect unanticipated attacks.

Routine Audit Discovers Welfare Fraud

(Continued from Page 1)

through welfare check deposits, he added.

"The woman is a real professional," Collins said. Most fraud can be detected fairly quickly with a computerized check, but anyone who forges a new identiy makes it more difficult, he admitted.

Williams might have gone uncaught, but she slipped up by using the address of another welfare recipient, he said.

The county computer system is programmed to hit on any person who supplies duplicate information, but because Williams used different identities and had identification cards that appeared legitimate, she was not caught until the address duplication was discovered, the fraud director said.

The system that matched the duplicate addresses was started last year in an effort to find cases where more than one welfare check was going to the same address. While most of these cases are legitimate, the system has caught a few other fraudulent cases, although none involved as much money as this one.

At present, the department collects $1.51 for every $1 spent on fraud detection, Collins said.

Williams allegedly began defrauding the county in 1971 and applied for aid at various intervals after that at different district offices.

In order to qualify for AFDC, each child's birth certificate must be shown and a current local address must be supplied. In each of the 10 cases, a routine home visit to the address listed was made and each checked out, according to Connors. Williams was always at the address with the required number of children, he said.

Williams managed this by using the homes of acquaintances; these individuals are being investigated for possible collusion, Connors said.

"It all seemed legitimate on the surface. There was no way a caseworker could have detected any fraud," he noted.

Williams turned herself in to authorities and will have a preliminary hearing July 10. Bail has been set at $50,000.

Flowcharting Study Urged

(Continued from Page 1)

according to committee chairman Ned Chapin, who noted that such an approach "fails to address the real and significant issues" raised by the general disinterest in the standard.

Along with the serious overhaul of X3.5-1970, Chapin's group recommended that Afips constituent societies and ACM in particular "require that all their publications use flowcharts conforming fully with the ANS standard" whenever they present flowcharts.

Unless the societies enforce the use of standard flowcharts in their publications and the standard is upgraded in line with the committee's extensive recommendations, the standard should be withdrawn "on the grounds of obsolescence and insufficient usage," Chapin said in conclusion.

Reasons for Rejection

The committee found several reasons for the current standard's low standing in the DP community. In the first place, "knowledge of the standard is not common among [DP personnel] except those that hold computer science degrees."

Beyond that, the standard is characterized as too rigid, too cumbersome, too costly and too ambiguous by those who know it but do not use it. The difficulty of maintaining ANS standard flowcharts "is well known," the report continued.

But the fact that there are alternatives, many reputed to be superior to conventional flowcharts, is the main reason the standard is largely disregarded, Chapin's committee indicated.

These alternatives range from hardware vendor-supplied flowcharting approaches, charts produced by proprietary flowchart packages and "Scat diagrams" to Chapin charts, Hipo charts, semicode and pseudocode.

But an independent study of these techniques "has never been done. Even a comprehensive, statistically well-designed sample survey has never been done," the report noted, adding "what should be the subject of an ANS standard is the few techniques that are the most valuable and the least redundant. No hard evidence exists that the current ANS standard flowchart so qualifies."

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Study to Reckon Date of Next Calif. Quake

By Brad Schultz
CW Staff

MENLO PARK, Calif. — The National Geodetic Survey (NGS) is using a large mainframe and specialized computer graphics equipment to map out a massive portion of southern California that many believe is long overdue for a major earthquake.

The U.S. Geological Survey (USGS) will apply its geophysics expertise to the NGS data analysis and computer simulation to determine the area's seismic trends and estimate when the big shocks might hit.

Called the Southern California Uplift, the 32,000 square-mile area is one of the most seismically active in North America, according to Peter Ward, chief of the USGS earthquake prediction unit here.

The Uplift encompasses most of inland southern California, including the cities of Bakersfield, Palmdale, Pasadena and Riverside. The area gained its nickname because scientists have discovered a consistent increase in "bulges" or "heaves" at numerous sites within the area.

When discovered, the Uplift was localized around Palmdale — on the western edge of the Mojave Desert — near the site of the most violent earthquake in California's history, a fact that excited the federal government's interest, Ward said. Although the heave has since spread, it is still known by some as the Palmdale Uplift.

Four Months of Measurements

Theorizing that California is long overdue for a massive shock in the 7.5 range on the Richter scale, such as the one that devastated Long Beach in 1933, USGS scientists intend to use Uplift data in an attempt to predict when that shock will hit, Ward said.

From January through April this year, about 40 three-person USGS crews measured the elevations of thousands of points in the Uplift. The crews used surveyors' transits to measure the elevations and entered the data in field notebooks. This data was later stored on magnetic tape and sent to NGS headquarters in Rockville, Md., for analysis on the agency's Control Data Corp. 6600 CPU.

The USGS has completed its field work on the project, but is still transmitting the resulting data to the NGS, according to Capt. John Bossler, NGS deputy director.

On the 300,000-word, 64-bit CDC 6600 the data is processed by several editing and formatting programs, Bossler said. It is then "adjusted" to eliminate redundancy errors — multiple readings of a given location — and to make allowances for such factors as the contraction or expansion of field-measuring tools because of temperature shifts.

This "adjustment" yields the definition of certain mathematical functions that comprise a model of the Uplift's dynamics, Bossler explained. The functions are input to Information International, Inc. FR80 computer output microfilm recorders, which then generate graphics simulations of the Uplift topography, according to Sanford Holdahl, also of the NGS.

When concluded, the NGS data analysis will be sent to the USGS at Menlo Park where Ward's earthquake prediction unit will begin its work.

'Superquake' Fears

The greatest shock in California since the record-setter of 1857 was the famous San Francisco Earthquake of 1906. These two jolts exceeded 8 Richter points, far surpassing the Long Beach leveller of 1933.

Scientists' apprehensions about a "superquake" in California have been enhanced by the relative lull in seismic activity experienced by the state since 1971, Ward said, pointing out that such quakes are "inevitable."

Researchers inadvertently discovered the Uplift when they noticed old elevation estimates for the area generally fell short of more recent estimates, he said. However, for coastal southern California, old estimates generally exceed the newer figures, indicating that such cities as Santa Barbara, Los Angeles and Long Beach are slowly sinking.

Elevation records are important considerations in planning the construction of canals and aqueducts on which this primarily desert region depends for its water supply, Ward explained. Although elevation fluctuations over several years are usually on the order of a few centimeters, minuscule changes in slope along the hundreds of miles these structures extend can entail large-scale changes in the money and materials necessary for their construction.

Prior to the USGS/NGS venture, elevation measurement efforts in the area were "sporadic" and uncoordinated, according to Ward. The current effort is the first to attempt a snapshot of the region that will serve as a reference for further studies, he said.

Congress appropriated about $60 million for use in earthquake research and information dissemination via the National Earthquake Hazard Reduction Act of 1977, of which half was tagged for the USGS and the other half for the National Science Foundation.

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Energy Modelers Urged to Think Pragmatically

By Jeffry Beeler
CW Staff

ANAHEIM, Calif. — Developers of computerized energy models should broaden their scope of professional concern to include both the practical as well as the theoretical implications of their work, Decision Focus, Inc. Vice-President Dale Nesbitt believes.

Too often in the past, computer modelers have viewed themselves primarily as technical specialists with little or no voice in deciding how — or if — their recommendations should be implemented, Nesbitt explained at the recent National Computer Conference here.

As a result he said, a philosophical gulf has formed between the theoretically inclined modelers and the more pragmatic decision makers who apply their work in government and industry.

One way to bridge the gulf is for model builders to revise their professional outlook and see their role "not as clairvoyants but as catalysts for decision making," Nesbitt urged. Fortunately, he added, modelers have already begun to move increasingly into decision-making positions, and he foresees no end to this attempt by the developers to gain greater control over the application of their work.

Nesbitt made his remarks during an NCC seminar entitled "Computer Models in Solving the World's Energy Problems." Other speakers at the session included chairman William Rousseau, an engineer with Lawrence Livermore Laboratory; Arvind Jain, a senior energy modeling analyst with SRI International; Al Miller, a principal of Applied Decision Analysis, Inc.; Philip Schweizer, an engineer with Westinghouse Electric Corp.; and Stanley Sussman, also an engineer with Lawrence Livermore Laboratory.

Reluctance to Communicate

Thus far in its brief history, computer modeling has only slightly affected energy planning and policymaking in the private sector, partly because the technique involves relatively recent technology and thus has gained little credibility among the general population, Nesbitt concluded.

Another reason for the minimal impact is that developers of computer models usually work alone and seldom communicate the results of their work to their professional colleagues. Nesbitt attributed the modelers' solitary working style in part to stiff competition for limited research and development funds.

"Modelers have little incentive to communicate with each other," he explained. "They're hesitant to exchange any information for fear it might benefit someone who's competing for the same research money."

Nesbitt also attributed the modeler's reluctance to communicate to fear of criticism from their colleagues, many of whom specialize and delight in refuting their rivals' work. "It's easy for a modeler to pull something over on a government decision maker or someone else who doesn't know anything about computers, but it's very difficult to fool other modelers," he said. "They're very sophisticated at finding flaws in each other's results."

Among their other work problems, builders of computer models also occasionally face ticklish ethical questions or sense their services are being recruited for narrow political ends, Nesbitt noted. At times, for example, they are asked to rig the results of a computer model to support the views of a vested interest or to perform work that otherwise threatens to compromise their professional integrity.

Elsewhere in his discussion, Nesbitt urged modelers to try to accomplish three objectives in their work. First, they should make sure their modeling projects are headed by individuals who understand the decision-making process in government and industry.

Second, they should direct their efforts toward clearly defined goals rather than toward general-purpose applications. A model that lacks this "decision focus" will probably prove of little or no value to its user, Nesbitt warned.

Third, modelers should try to establish improved lines of communication with the decision makers who ultimately determine the fate of their work, he added.

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DPers' Status Undetermined

Lawyer Explores Liability Issues Linked to DP

By Nancy French
CW Staff

ANAHEIM, Calif. — As technology comes into broader use in all phases of work — from building airplanes to making seat reservations — new liability issues are arising when those processes go awry, according to Lawrence S. Robertson of the Washington law firm of Zuckert, Scoutt and Rasenberger.

Speaking here recently at a National Computer Conference session on legal issues of computing, Robertson explored some fascinating and problematical new territory at a session that drew only about 50 people.

Picking examples from actual cases, Robertson asked, rhetorically, who is liable in the case of a fatal aircraft accident whose cause was blamed on metal fatigue in the plane's wings if the wings were tested using a computer simulation rather than the traditional wind-tunnel testing. Is this a possible case of negligence?

Another somewhat less serious case dealing with computer assisted seat reservations raised some equally interesting questions. According to Robertson, many airline passengers don't actually get the cheapest rate to which they are entitled because the fares change so fast and reservations clerks can't keep up. A tariff display that could be flashed on the CRT screen to aid those clerks is often not used at the request of airlines management because the CPU is overloaded and can't accommodate it.

Perhaps one passenger paying $100 too much for his ticket is not too serious a problem, Robertson said. But suppose the airlines were confronted with a class-action suit involving many thousands of passengers who were overcharged? Could negligence be proved, he asked.

On the other hand, following the standards set in the area of medical liability, could negligence be ruled in a situation in which a computer was not used to do a specific job — and a computer in fact is not the normal standard — but the job could be done better by computer? he asked.

Suppose, he said, that a vendor rushed a computer system to completion without proper debugging and memos documenting complaints about this written by professional employees assigned to do the work are found during the discovery portion of a lawsuit filed by a user. This can be used against the builder of the system, he indicated.

This would be more of a problem to the employer if programmers are judged to be professionals rather than merely employees, session chairman James P. Chandler indicated, adding that still remains to be settled.

Programmers' Status Unresolved

Many such issues will go unresolved or will be ruled on in courts and reversed on appeal until the status of computer programmers is determined, Chandler indicated, and it is inevitable that this will occur, he said.

The unresolved question of "professionalism" vis a vis the computer programmer blurs another area, too.

Every programmer goes from job to job with decks of cards and various computing tools he developed during his career so he won't have to reinvent what he did at the last job, Robertson noted.

Although the materials were developed for an employer, what has not been resolved is what the rights of the program authors should be, he pointed out. Do those program subsets the programmer wrote belong to him or to his boss? What if the employer continues to get the benefit of them after the author leaves?

Employers Liable for Copyright Violations

By Nancy French
CW Staff

ANAHEIM, Calif. — Companies that use copyrighted licensed software packages could be liable to the software vendor if the restrictions on the use of the packages are not spelled out in writing to its employees and one of those employees copies or transfers a program in violation of the vendor/-user agreement, Michael S. Nash, a computer scientist with the National Institutes of Health, said here recently.

The framework supporting Nash's argument assumes the programmer to be "an employee" rather than a "professional," National Computer Conference session chairman James P. Chandler pointed out. Chandler is a professor of law at George Washington University.

Nash, who fainted before he was able to complete his presentation, was assisted in its completion by Chandler.

Four Players

According to Nash, in a scenario in which an employee copies or steals a licensed copyrighted, package and then transfers it to someone else, there are a number of players, and each has certain rights. First, there is the vendor, who invested heavily in the product's development; secondly, there is the employer/user, who licensed it.

The third and fourth players are the employee who appropriated it and the transferee who paid the employee for its use.

The rights of each one are not clear, and rulings in specific cases vary from state to state and court to court, Nash indicated. Perhaps legislation rather than the courts will resolve some of these questions, he suggested.

For a vendor to sue successfully to protect the license of one of his packages, he must prove first that he owns it and that it has been validly copyrighted. Then he must prove that the individual accused of appropriating it had access to the copyrighted material and, finally, that the so-called copy is similar to the vendor's original work, Nash said.

Who can be liable? The employee — "or by then ex-employee" — who distributed copies of the copyrighted material; the employer, on grounds of negligence, if it can be shown he failed in his obligation to protect it — even if he made no gains from its transference; and finally the transferee, whose copy of the program can be ordered destroyed even if the transferee paid for it, Nash said.

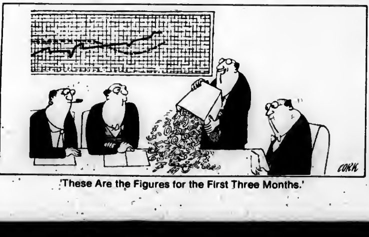
The prudent employer can protect himself by including provision in a DP employee's contract that describes his responsibilities in handling licensed software. This protects him from claims of negligence, Nash indicated.

The federal government, according to Chandler, has strict policy guidelines in this regard. If software is transferred to an agency without specified limitations, it is deemed to be transferred without limitation and treated accordingly.

If the software is transferred with limitations, personnel are urged to consult legal counsel to determine their responsibilities and assure they are fully appraised of the agreement under which the software is being licensed.

In the area of patent law, anyone who copies functions — rather than merely the "expression of those functions" protected by copyright — is liable, Nash said. The employer's liability would depend on whether the employee made the infringing copy at the direction of his employer and whether the employer benefited.

The patent owner has the civil right to protect his property and can sue both the transferee and the employer and be awarded damages from both, Nash said. However, since few programs are patented, this holds less potential danger for the DP manager, he indicated.



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Regulate Selves or Be Regulated, DPers Warned

By Jeffry Beeler
CW Staff

ANAHEIM, Calif. — DP personnel should begin to regulate their profession from within before standards are imposed upon them by the nation's laws and courts, according to Dr. Gary Casper, president of the Institute for the Certification of Computer Professionals.

During the last few years, public concern about privacy threats and other social implications of computers has mounted steadily and fueled growing demands for increased professionalism in the DP field, Casper said during a seminar at the recent National Computer Conference here.

To meet these demands, computer professionals should set minimum standards of competence for their peers and then devise a universally accepted method of testing that competence, Casper advised. Such a method might take the form of a standardized certification exam or even a formal licensing program, although Casper concluded the latter option "is still a long way away."

Whatever method of, enforcement they choose, DP personnel must soon adopt a uniform code of professional standards. If they hesitate; the push for increased regulation of DP competence will come from the government or some other source outside the computing field, he warned.

Why have DPers lagged so badly in enforcing high levels of professionalism among their peers? Speaking at a session entitled "What is Professionalism?", Casper partly blamed the apparent resistance to regulation on the phenomenally rapid pace of development in computer technology.

'Future Shock' Victim

"This industry, more than any other, suffers from future shock, the premature arrival in the future," he noted. "No sooner does one development appear on the scene than something else comes along to replace it."

In an industry in which technology changes so rapidly that no individual can master all of it, Casper said, competence eludes easy definition; something that can't be defined can't be measured.

But as the social impact of computers has become increasingly visible and pervasive, the public has begun to expect of DP personnel the same standards of professional competence, accountability and integrity that had formerly been reserved only for the more traditional professions like law or medicine, Casper observed. As an example, he cited recent court cases in which DPers were ruled professionals and thus liable to malpractice suits.

Unfortunately for computer personnel, these rulings only hint at the outside control that awaits them unless they soon begin using certification to prevent incompetents from entering their ranks, Casper said. Not only would a nationwide certification program preempt future attempts by the non-DP world to regulate activities of DP specialists, but it would also reap more positive benefits like fostering high ethical standards in the profession and controlling the quality of computer science curricula, he predicted.

Computer professionals interested in promoting certification should learn more about the concept from an appropriate professional association and then take a certification exam, Casper recommended. After passing the exam, they should join a professional society and further advance the certification cause among fellow members, he said.

SCS Sets Course On Simulation

LA JOLLA, Calif. — The Society for Computer Simulation (SCS), in cooperation with the program committee of the 1978 Winter Simulation Conference (WSC), will present a professional development seminar covering modeling and simulation for business and industry on Thursday, Dec. 7, the day following the rest of the WSC program.

The seminar has been planned and will be conducted by Professors Paul Gray and Steven Alter of the Graduate School of Business Administration, University of Southern California (USC). The material will be based on a short course, "Managing the Future," given at USC seven times over the past two years for corporate planners, managers and analysts.

Although the seminar is introductory and will not assume sophistication in either simulation or long-range planning, it will cover models for the future, the gathering and use of expert opinion (including Delphi techniques), trend and cross-impact analysis methods and the development and use of scenarios, SCS said.

Gray is professor of decision science and a senior research associate in the university's Center for Futures Research. He has specialized in large-scale problems in transportation and urban fields.

Alter is assistant professor of decision science at USC and received his Ph.D. from the Sloan School of Management at MIT. His areas of specialization include computer-aided decision making, long-range planning.

Further information on the seminar, location, fees and registration will soon be available from SCS, Department PR, P.O. Box 2228, La Jolla, Calif. 92038.

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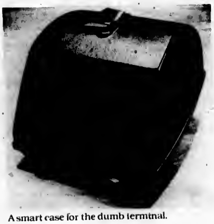

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NCC Panelists Agree:

Voice Input Not Yet Viable for Most Users

By Ann Dooley
CW Staff

ANAHEIM, Calif. — More research is needed before voice input systems can be considered viable alternatives for computer users, according to panelists at the recent National Computer Conference here.

Chaired by George Glaser of Centigram Corp. of Sunnyvale, Calif., the panel also agreed that some midground will have to be found between very sophisticated systems and isolated word systems.

Wayne Lea, panel member and research linguist at the Speech Communications Research Laboratory in Santa Barbara, Calif., told attendees that voice input has benefits because it is the most natural modality, takes little or no training, allows for fast communication and leaves the hands and eyes free for other tasks.

On the other hand, the problems inherent in voice input are vocabulary limitations, speaker variability problems caused by changes in sex or dialect and environmental noise and distortions. Other problems include the lack of privacy and the systems' high cost, he said.

Lea outlined the various forms of word recognizer systems, such as those that recognize isolated words, sequences of isolated words, connected sequences of isolated words, connected sequences of digits or words in restricted formats.

He also told attendees about the goals and achievements of the Advanced Research Projects Agency (Arpa) voice input project, begun by the Department of Defense in 1971.

Arpa's goal, which has been accomplished for the most part, was to design a system that would accept continuous speech from many cooperative speakers. The system was to accept a 1,000-word vocabulary with artificial syntax and do so with less than 10% semantic errors.

Continued Research Essential

Current recognition systems range from inexpensive hobbyist models to full, expensive, accurate systems, Lea noted.

Continued research is important, however, in order to apply the recognition systems to more difficult tasks, he pointed out.

Lea summed up many of the issues surrounding voice recogniton systems. One controversy is whether continuous speech — or complete sentences — is really needed, especially given the extra work and cost. Other points of debate include mathematical models vs. linguistic representations, what role research should play, how it should be funded and the danger of fraud in voice transactions.

Building, Evaluating Recognizers

Raj Reddy, a professor at Carnegie-Mellon University of Pittsburgh, Pa., commented on how to build and evaluate linguistically developed word recognizers. He told attendees about his work in developing a cost-effective, yet powerful system.

The speech recognition systems are complex graph structures used to convert passive knowledge into active, he said.

An utterance is digitized, put through acoustic units and matched and then the system finds the optimum sequence of matches to find the correct word, Reddy said.

Whatever the matching network method, all the systems still need to be improved for speed and accuracy, he said. Current voice input systems have a much higher word accuracy than sentence accuracy, Reddy noted, adding that more errors occur when more than one speaker is involved. During telephone speech, the error rate triples, he added.

The system's vocabulary size is important as far as memory requirements go, but it is not important for accuracy, Reddy noted.

Continous Speech Experiments

Lalit Bahl of IBM Research in Yorktown Heights, N.Y., told attendees about his experimentation with continuous speech recognition systems. The idea is to perform successively more difficult experiments using more complex language, he said.

The first task accomplished was to design a 7-digit phone number vocabulary with 11 words, he said. From there, the experimentation went on to a finite state language using 250 words and an average sentence of eight words, he noted.

The error rate was very small and the correct syntax was used, but the sentences had no meaning, Bahl said.

The next experiment undertaken was a restricted-domain task designed with the ability to use only certain words and an average sentence length of eight words, he said. In this case, the error rate was even smaller, Bahl noted.

Bahl next tried a laser patent text using sentences read from a particular domain and with unspecified grammar or natural langauge. A text of 1,000 words was used and the average sentence length was 24 words.

With this system, the error rate zoomed upward, he said. It was the same system, in principle, as the others, but it was a big step to go from a system of restricted text to one in which the number of words was limited without limiting the syntax, he said.

It's a difficult problem to go beyond the restricted domain task system which has been proven successful on a limited basis, he said, but there is still a long way to go before a speech pattern recognition system will be developed that will satisfy most people.

Voice Systems Perform Well For Some Security, Business Uses

ANAHEIM, Calif. — Although voice input systems still have many limitations, some systems do perform very effectively in those applications, panelists said at the recent National Computer Conference.

A Texas Instruments, Inc. security system developed for identity verification for the Air Force is "resistant to imposters, flexible, controllable, fast, convenient and efficient," according to George Doddington, a TI researcher.

Called Base and Installation Security System (Biss), the system is used in entry control and has demonstrated 1% user rejection, 3% imposter acceptance and 6.2-sec verification time, Doddington said.

The system was designed so that upon insertion of an ID card, a recorded voice utters four words in a random pattern and the person waiting to be admitted repeats the utterances. The system was programmed to match the voice and ID of the person waiting to be admitted.

Reference data is adapted after each utterance so the voice input system does not misinterpret the voice pattern after just one utterance. If there is any doubt (as there might be if the person had a cold, for example), utterances are repeated until the system makes the correct identification.

Don Connolly, energy researcher at the National Aviation Facilities Experimental Research Center, outlined several possible uses of voice verification techniques in air traffic control work as well as in urban mass transit, the Coast Guard and for air updating and maintenance.

Tom Martin, president of Threshold Technology in Delran, N.J., also suggested voice data entry systems could be used in inventory and quality control work.

A microphone could be used to enter the information directly to the computer in an on-line, real-time mode so if an error occurred, it could be corrected immediately.

Once the price/performance barrier is broken, it will become accepted and voice input use will accelerate substantially, he said. Various other possible uses include visual defect reporting, grading/sorting/inspection and parcel sorting operations, Martin noted.

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Less 'Hostile' Regulation Seen Stimulating EFT

By Marguerite Zientara
CW Staff

ANAHEIM, Calif. — "A less hostile legal and regulatory structure conducive to competition among electronic funds transfer [EFT] service providers" is an essential element to the success of EFT systems, Robert Zimmer, senior partner in the Washington, D.C., law firm of Zimmer, Egge & Sisk, said here recently. His forum was the session entitled "Legal Issues in EFT Developments" at the 1978 National Computer Conference.

Four areas on which legislators and regulators are presently concentrating are branching, terminal deployment, EFT terminal and system sharing and government operational involvement in EFT, Zimmer said.

Banks, savings and loan (S&L) associations and credit unions are governed by three different sets of branching laws administered by three different regulatory agencies, he noted. Furthermore, in 1976 the Comptroller of the Currency ruled that terminals are bank branches and therefore subject to the same limits as brick-and-mortar branches.

Under existing law, state and national levels also have conflicting legislative rules on remote facilities, resulting in some anomalous circumstances. In Illinois, for example, some banks have deployed EFT terminal systems, but only thrift institutions that share them can use them for services other than check authorization, Zimmer said.

Senate Bill S. 2293, introduced by Sen. Thomas J. McIntyre (D-N.H.), will be adopted in some form by 1980, Zimmer believes. That bill was designed to implement the recommendations of the National EFT Commission and would permit federally chartered banks, S&Ls and credit unions to establish or use an EFT system anywhere, with geographic limitations only on deposit servcies.

According to the bill, out-of-state deposit services could be offered in states permitting such services and, after Jan. 1, 1980, deposit services could be offered throughout an institution's "natural market area," regardless of state law, Zimmer said. The bill also stipulates that an EFT terminal is not a branch.

Congress is also likely to adopt S. 2293's proposals regarding sharing by applying antitrust standards to EFT systems and preempting state compulsory sharing laws in order to avoid conflict between state and federal policies in this area, Zimmer said. There are no federal statutes expressly applicable to sharing EFT systems, but 22 states have enacted legislation requiring some form of sharing. The legislation, however, is not uniform, he noted.

Federal Involvement

Perhaps the most significant short-run trend — and the one that poses an obstacle to the development of EFT in a flexible and competitive environment — is the growth of government operational involvement in EFT, according to Zimmer.

The Federal Reserve recently adopted a plan to provide a nationwide electronic switching service for clearing and settlement through automated clearinghouses (ACH) by the end of 1978. This plan is inconsistent with the commission's recommendation to oppose expansion of government operations beyond regional services currently provided by the Fed, Zimmer pointed out.

"Most of these developments will help decrease the cost of financial services, expand the number of locations at which services can be provided and encourage variety and diversity in services," he concluded. Government operations, however, pose a substantial threat to competitive systems, he said.

Emphasis on Privacy

The National EFT Commission placed heavy emphasis on the issue of privacy and public policy during its 21 months of considerations, according to Jim Howard, consultant to the White House Domestic Policy Staff. Howard acted as general counsel to the commission, which issued its final report last October.

Some general principles guided the commission during its deliberations, Howard said, one of which was maintaining a basic level of consumer protection. The commission also kept in mind that EFT transactions are outside the traditional provisions of the law, he said.

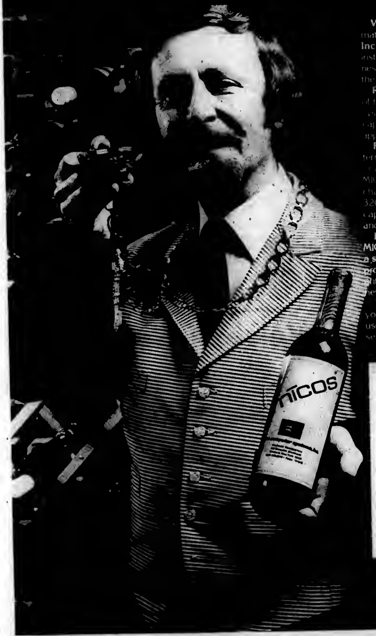
Further, the commission felt "new" technology shuld promote competition among financial institutions and across industry lines and government regulations should be minimized to increase competition in the private sector as an impetus for development, Howard said.

Another area of individual protection is that of liability which, like bank branching law, is legislated differently in different states, according to Roland Brandel, an attorney with Morrison, Foerster, Holloway & Clinton of San Francisco.

Two bills introduced last fall — S. 3156, by Sen. Donald W. Riegle Jr. (D-Mich.) and H.R. 1277-5, by Rep. Frank Annunzio (D-Ill.) — would affect contractual relationships between financial institutions and customers, Brandel said. The bills would establish the Federal Reserve Board as the primary regulator in such contractual matters.

The bills stipulate that the consumer

(Continued on Page 16)



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With $4.2 Million Machine

DES Critic Says He Can Crack Code for $23

By Brad Schultz
CW Staff

ANAHEIM, Calif. — One of the most outspoken critics of the federal Data Encryption Standard (DES) has a method that purportedly can crack DES codes at a cost of $23 per solution at a rate of 100 solutions per day using a machine comprised of parts costing $4.2 million.

Stanford University Prof. Martin Hellman announced his findings, which he said have been developed only within the last month, during a session on encryption technology at the recent National Computer Conference here.

In the past, Hellman has maintained that the standard, adopted last year by the National Bureau of Standards (NBS), could be cracked by the 1980s by an organization able to develop a special-purpose computer costing about $20 million in parts at an average cost of roughly $5,000 per solution at a rate of one to two solutions per day [CW, Jan. 8].

The DES relies on a key length of 56 bits, and Hellman claimed his theoretical machine could try every possible combination of 56 bits to crack a particular user's key.

The NBS has vigorously disputed Hellman's claim, arguing the DES cannot be cracked by any organization and is therefore suitable for the protection of the most sensitive kinds of data.

In April, the U.S Senate Select Committee on Intelligence announced some conclusions of a still-classified report on DES, culminating its investigation into whether the standard can be cracked and whether critics of the standard had been subjected to "harassment" by the National Security Agency (NSA) or other components of the U.S. intelligence community.

The consensus of scientists polled by the committee was that the standard could not be cracked for at least five to 10 years. The committee further found that the NSA had not harassed DES critics [CW, April 17].

Brute Force Attack

Hellman has now introduced a model in which a certain kind of brute force attack on the DES, using 1978 technology, can uncover the method used to encrypt a portion of text. However, the model has two important qualifications: the method, or key, cannot have been selected by the encryptor in a completely random fashion; and the encoding must have been performed in plain block mode — that is, without multiple iterations or "doubling back" of the basic encryption operation.

Hellman's attack on the DES would be of the sort known as "ciphertext only," where the attacker relies on a "probable plaintext block." This means the attacker feels confident in assuming that a block of characters in the target data repeats with a certain, roughly reckoned frequency.

Such a block might be expressed in plaintext, or noncoded form, as eight contiguous blank characters or the phrase "CRLogin:," where "CR" denotes carriage return — a phrase commonly found in terminal transactions.

Hellman's scheme requires 100 tape drives costing about $2 million. These drives would read 10^{13} bits of information stored on 10,000 tapes in one day, Hellman told the NCC session, adding that 100 "fast memories" — special-purpose LSI chips — and 10,000 DES chips such as the recently announced Fairchild Semiconductor Corp. DES chip also would be needed.

The Fairchild chip, said to encrypt text via the DES in about 10 microseconds per operation and to cost about $100, is the prototype DES chip in Hellman's model.

Hellman claimed his hypothetical system will solve 100 DES "problems" simultaneously. Although his $23-per-solution estimate could be increased by a factor of four when overhead costs were taken into account, it is plausible that cheaper components could be used in the system to achieve a cost-per-solution in the range of $1.

Dr. William L. Tuchman of IBM's System Communications Division, who played a key role in IBM's development of the algorithm NBS adopted as the DES, indicated at the session he was surprised by Hellman's announcement, but made clear his immediate reaction that Hellman's scheme is invalid.

Tuchman, however, did concede in response to a question from the floor that the U.S. Department of Defense may not be using the DES to encrypt its most sensitive data, indicating the department considers the standard of questionable strength in view of recent criticism.

Dr. Dennis Branstad, a former NSA employee who directed the DES project at the NBS and continues to direct the bureau's development of other DP standards, told the session a federal data communications standard is presently under consideration that would limit federal agencies to encryption in character-by-character cipher feedback mode and, for packet communications, to cipher block chaining mode. Hellman agreed this would render text encrypted in conformity with the DES safe from attack by his scheme.

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DP Auditor Seen Biggest System Security Risk

By Marguerite Zientara
CW Staff

ANAHEIM, Calif. — "The DP auditor is the real key to the security of EFT systems, since there are no controls over him and therefore the highest risk is associated with him," according to Russell H. Dewey, management systems consultant for SRI International.

Chairing a recent National Computer Conference session here entitled "Technical and Social Issues of Electronic Funds Transfer Systems," Dewey noted that 2,000 of the 10,000 cases of missing funds reported annually by financial institutions involve computer abuse

Half of those 2,000 cases, with an average loss of $20,000, involve collusion among several employees, he added.

"Regulations lag far behind the state of the art for computer cime," Dewey said, noting that dollar amounts in electronic theft far exceed amounts in a teller's drawer. Furthermore, while a teller theft may take minutes, an electronic crime can be committed in milliseconds while the perpetrator is anywhere in the world with a terminal.

The electronic thief has access to vast reservoirs of funds, leaves no fingerprints and is not photographed, Dewey pointed out.

Dewey cited known electronic crimes, such as the modification of credit authorization files, the use of counterfeit credit cards and "piggybacking" of previous EFT transactions in which a customer doesn't sign off properly.

In Tennessee, there was a case in which empty envelopes were deposited into automated teller machines (ATM) and credit was given for the amount claimed. Last month $140,000 was stolen electronically from Fedwire, he said.

DP Professionals Blamed

While personal identification numbers (PIN) help prevent imposter-type crime, while encryption prevents wiretapping and while a locked computer room can prevent physical attack, Dewey claimed most electronic crimes are committed by DP professionals with the necessary skills and access to vulnerable points of a system.

Frequent low-loss theft is committed by EFT customers, ATM clerks and tellers, salespeople and data suppliers, Dewey said. Of low frequency but high loss is theft by data entry personnel, media librarians, computer operators, peripherals and remote terminal operators and systems analysts.

Further, he noted, systems programmers and field engineers have the ability and opportunity to modify systems for theft.

To combat these threats, a number of system audit techniques and application controls are currently available to the system designer and more are under develoment.

In his speech, Dewey cited the booklet, "A Guide to DP and EFT Security Based on Occupations," available from the Federal Deposit Insurance Corp. as a source of general information.

Standards Also Problem

Standards as well as security are a problem in EFT, according to Irwin H. Derman, vice-president in charge of systems development for Visa.

In the Visa environment, Derman said, there are 60 million cardholders, 2.5 million merchants, 200 acquiring facilities (banks that sign up merchants), one national switch and 800 card issuers (such as banks, savings and loan associations, mutual banks and credit unions).

Each of these categories is setting its own separate standards. The International Standards Organization and American National Standards Institute are also working on industry standards, he said.

Derman believes standardization is needed in the areas of terminals, plastic cards (physical characeristics, magnetic stripes and account numbering), the security and privacy of data and the data formats of communications networks. "We must use standards to separate; not confuse," he said.

Fewer EFT Rules Seen Stimulant

(Continued from Page 14)

be told the "rules of the game" before he becomes an EFT customer, that the customer be sent a monthly statement with specific transactional information and that the consumer be given a written receipt at every transaction, also containing specific information, Brandel said.

The bills also contain strict error resolution requirements in which credit card, checking and EFT transactions are treated differently, he said.

In the area of dollar liablity, the bills place a $50 limit on consumer liability with the rest payable by the institution, except in the case of customer negligence. If a bank improperly processes a transaction, it is liable not for the value of the transaction, but for "approximate damages," Brandel said.

For example, if a fire insurance policy payment were to be mishandled, causing the policy to lapse, and the policyholder's house burned down, the bank would be liable for the price of the house, not just for one premium payment, he explained.

In addition, the bank can be sued for up to $500,000 if it violates the provisions of the bills, Brandel said.

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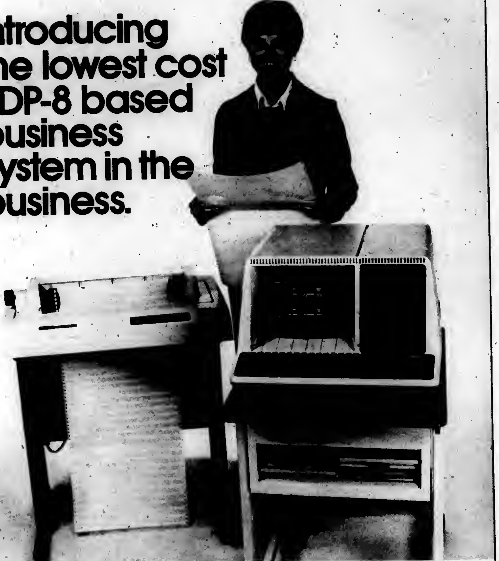

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Proving Real Stumbling Block

Consumer Approval Held Main EFT Challenge

By Marguerite Zientara
CW Staff

ANAHEIM, Calif. — The major challenge to the implementation of electronic funds transfer (EFT) systems is that of consumer use and acceptance, according to Robert Halem, financial industry specialist for IBM in Los Gatos, Calif.

Speaking at a recent National Computer Conference session on "Current Developments in EFTs" here, Halem said that while EFT systems have been ballyhooed as "the coming thing" for the past 10 years, individuals and institutions are less willing to accept the accompanying change than had originally been contemplated.

At present, EFT technology makes possible on-line transactions, automated tellers, point-of-sale (POS) systems, bank-at-home arrangements and corporate EFT systems, Halem said. There are many reasons for implementing EFT technology, including the growing volume of banking transactions, the increasing cost of handling those transactions, the pressure to extend banking hours and the demand for new financial services, he stated.

A process of homogenization is taking place among banks, savings and loan associations, credit unions and mutual banks that will allow different types of financial and nonfinancial institutions to offer similar services to the consumer, he added.

In the case of automated teller machines (ATM), Halem noted "people stand in line to use them, even when human tellers are free, because they are predictable." POS, however, has been slow to develop because it offers "zero benefit" to the consumer, he said, while offering recordkeeping benefits to banks and retailers.

In addition to the problem of consumer acceptance, implementation of EFT faces other challenges as well, such as economic justification, the need for a smooth transition from present systems and an effective interchange of formats, content and procedures. Also necessary is adequate security, which is coming, Halem said.

Additionally, financial institutions using EFT systems must satisfy legal and regulatory requirements, he pointed out.

Successful Experiment

A government experiment with EFT, the Treasury Department's direct payment program, has saved money while increasing payment security, according to Robert Thompson, assistant director of the program. The Treasury Department — the nation's "bookkeeper" — has made payments for various retirement plans as well as interest payments for securities by mail.

"In many cases, checks are lost or stolen. Moreover, when the endorsed check comes back, the department must process it again," Thompson said.

Two years ago, the Treasury Department began making EFT payments through the country's 32 automated clearinghouses, which transfer the funds to the proper financial institution for credit to the account of the payee. There is a net savings of 13 cents on each transaction, Thompson said.

Five federal programs are eligible for direct deposit via EFT: Social Security, Supplemental Security Income, Railroad Retirement payments, Civil Service Retirement payments and veterans' benefits. Within these programs, 43 million payments per months are being made electronically.

Coming soon will be military services payments, such as Air Force active duty and Air Force retiree payments, which will amount to six million payments per month, Thompson said. Potential programs include Internal Revenue Service refunds, veterans' educational and insurance benefits.

In order to participate in the EFT program, potential payees must sign up for it, Thompson said. The Treasury Department has made a number of television and radio public service announcements regarding the program, as well as inserting flyers in check-payment envelopes describing the program.

"We always include a notice when issuing a substitute check for one lost or stolen," Thompson said.

Other efforts to publicize and explain the system include slide presentations made before groups of retirees and one-day seminars for financial institutions.

Retailer Not Pleased

Less pleased with EFT developments was Del Olson, assistant controller at Dayton-Hudson Corp. in Minneapolis, who contended that the retailer has not been considered enough in the development of EFT.

Further, he said, the economic balance between the retailer, banker and consumer has not been clearly delineated. Olson believes it is the responsibility of the bankers to do this because they are the developers of EFT.

Olson described the expected development pattern of EFT systems and then proposed his own version of the proper development of EFT. The expected development would involve small and independent retailers first, possibly forcing the larger stores to follow suit, Olson said.

Combination or "look-alike" cards will then probably flood the marketplace, and the last stage will be mandated sharing of facilities, he said.

"Look-alike" cards are such things as those issued by Visa, on which the faces of the cards are identical, but the back identifies it as either a credit card or "banking card" (debit card), Olson explained.

Olson proposed that financial institutions reconsider the use of combination cards, refrain from tying debit cards to credit cards and keep debit cards "local." More than 99% of all checks are written on local banks, he said, maintaining that credit cards negate the need for a national checking system.

Olson feels there should be a balance between the short-term benefits to retailers from EFT systems and the long-term benefits accrued by banks.

Since banks invest in hardware, he said, they experience a return on that investment; retailers, however, experience no return on their investment in people.

Olson suggested that retailers invest in hardware and levy transaction fees on banks — "a dime a time," as he put it.

For retailers to adopt the system, there must be a financial incentive to the retailer and there must be some sort of protection for his investment: further, customers must be trained to use the system so it will be efficient.

In a question-and-answer period following the session, one attendee responded to Olson's comments on local-only debit cards by saying, "The only reason I use a credit card is because I can't cash a check out of the local area." That observation was met with applause by the rest of the audience.

Framingham State College Given DEC Minicomputer

FRAMINGHAM, Mass. — A Digital Equipment Corp. PDP-8/I minicomputer has been given to Framingham State College here for use by physics and computer science majors. The system was the joint gift of George S. Lee Jr., educational liaison officer of Yankee Technical Industries, Inc. (YTI) and of YTI, a spokesman said.

Physics Department Chairman Dr. Arthur Doyle expects to develop at least one additional course involving the PDP-8/I and a Compumedic analog computer recently given to the school's physics and mathematics/computer science departments.

The Compumedic machine was given to the school by the Naval Air Reserve through the efforts of Charles Viau, a computer science major at the college and a member of the Naval Reserve.

A spokesman for the school said computer science majors and others working on hardware/software projects will be engaged in directed study assignments, as well as internship projects at the company plant.

The work will be done under the supervision of the college faculty and the YTI technical staff, mostly centered around the donated facilities.

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Models Reported Having Little Sway in Policy

By E. Drake Lundell Jr.
CW Staff

ANAHEIM, Calif. — The effects of computer simulation and modeling on policymaking in the public arena have been "slight," Dr. Granino A. Korn said at the recent National Computer Conference here.

Korn — speaking at a session on "Large-Scale Simulation: Can Large-Scale Models Alleviate World Resource Problems?" — said models rarely make valid predictions about large social systems and therefore have little effect.

At the same time, however, the University of Arizona professor noted models do give policymakers a quick look at various ideas and can prevent some bad policy decisions, particularly when a model is limited to a fairly short-term prediction.

But "the cumulative effect of unknown variables" makes modeling not particularly useful for longer range projections, he said. He criticized in particular the doomsday models of Dennis Meadows for the Club of Rome, published as *Limits to Growth,* that predicted the world would run out of resources in the next century.

Furthermore, Korn said such predictions and models turn off the general public to modeling and may mislead the general public.

Too Late to Help

Another panelist, William E. Cundiff, a researcher with the Institute for Research on Public Policy in Montreal, said he feels models can help the world overcome its resource problems. But he is worried that by the time the models gain acceptance by policymakers, it might be too late to have that effect.

In order to make such models more effective, more communication between models and model makers is necessary, Cundiff said, suggesting a worldwide communications network to link separate efforts going on around the globe.

Such a network could accelerate the validity testing of large-scale models, he said, and serve to check out models when they were in the discussion and development stages, rather than after they had been developed and implemented.

In another area, James N. Hartley, a senior development engineer for Battelle Pacific Northwest Laboratories, said modelers also need to gain a better understanding of the terms and the applications on which they rely.

In some cases, he indicated, models have come up with dire predictions just because the model makers did not fully understand the meaning of some of the data they fed their models.

For example, he noted, some have used the figures on the "reserves" of various minerals as the total amount of minerals left in the world for resource models. This is not valid, he said, explaining the reserves are just that portion of the resource that can be exploited by available technologies and at current prices; while the amount of "resource" left is much higher.

NCC Interpreted For Deaf DPers

ANAHEIM, Calif.— Through the efforts of Dr. Steven Jamison of IBM in Palo Alto, Calif., three interpreters were on hand at the recent National Computer Conference to translate verbal messages into sign language for eight deaf attendees.

The service has been offered at NCC for the last five years and is part of an effort to pave the way for the deaf to enter the DP field, according to Rick Hernandez, one of the interpreters.

When asked how nontechnical interpreters handle technical material at NCC sessions, Herandesz said it is very difficult. Architectural configurations, technical descriptions and buzzwords give an interpreter the most trouble.

Since signing consists of either conceptual signs or time-consuming finger spelling, and since many technical phrases are made up of a string of letters and numbers, an interpreter often finds himself spelling out of a considerable portion of a speech, Herandez explained.

Because signing requires such a "kinetic involvement," according to Herandez, the NCC interpreters worked for 20-minute periods followed by 20-minute breaks.

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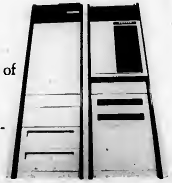

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'Living History' at Stake

DPers Urged to Preserve Papers for Posterity

By Howard A. Karten
CW Staff

ANAHEIM, Calif. — "Save your notes, technical papers, anything related to your projects," Jean Sammet urged attendees at a National Computer Conference session here recently on the history of programming languages. "You never know what their value will be in 20 years."

Leading the session devoted to the problems and results of the History of Programming Languages Conference held in Los Angeles immediately prior to NCC, Sammet — the chairman of that conference — recounted some of the problems encountered by participants.

Two of these, she said, were the inability to locate old files and notes and the difficulties faced by the invited participants, most of whom are currently involved in research, in getting away and in justifying to their organizations their participation in the conference.

Sammet's co-panelists at the NCC session agreed that the conference, which was held by the Association for Computing Machinery's Special Interest Group on Programming Languages (Sigplan), had been a valuable learning experience, but was not without its difficulties.

Recounting his own efforts in gathering material and preparing his paper for delivery, Ralph E. Griswold of the University of Arizona cited the work involved in sifting through "a small mountain" of documents, which he said included handwritten notes and memos, 25 file drawers and a considerable amount of machine-readable material.

'Inaccuracy of Recollection'

Griswold, who was a pioneer in the development of the Snobol language, said writing a historical paper is difficult and demanding when compared with writing a technical paper because of the need to often rely on memory. Pointing to "the inaccuracy of recollection," Griswold said he was helped significantly by his wife, who not only has some background in computer languages, but a degree in history as well.

Offering a slightly different perspective on the problems encountered in collecting "living history" from those involved in making it, Henry Tropp of Humboldt State University in Arcata, Calif., said the problems of historical research are by and large the same regardless of the specific nature — social or technical — of the subject.

Tropp, a historian of science, agreed with the other panelists that perhaps the main problem involved in writing a living history is that of "distortion of the past, based on what you know today."

An overall view of the Sigplan conference was given by James J. Horning of the Xerox Palo Alto (Calif.) Research Center, who said two recurrent themes could be discerned: the "oh-it-was-done-in-a-hurry" theme and the idea that committee-developed languages differ in significant ways from author-developed languages.

While not elaborating on the nature of the differences, Horning said the lesson to be learned is that committees should not be established to solve technical problems, nor should individuals expect great success in attempting to solve political problems.

Two morals regarding the endurance of languages can be drawn from the "in-a-hurry" idea, according to Horning.

The first is that "languages often last longer than we intend them to" and greater care should therefore be given to initial development efforts; the second is that software techniques developed "just as a tool for our own use" have a way of becoming disseminated — an observation familiar to many programmers and analysts.

Further, Horning stated, "technical excellence in a language is important, but is neither necessary nor sufficient to establish language vitality." Other factors, such as ease of learning, government support and the total system in which a language is embedded, ensure the use and survival of programming languages.

Recording Tricks

Jan Lee of Virginia Polytechnic Institute and State Univeristy in Blacksburg, Va., who served as administrative chairman, of the Sigplan conference, spoke of the tricks he used in trying to record that conference. Since the organizers of the sessions wished to be as unobtrusive as possible in doing the recordings, microphones were secreted in table decorations.

This strategem worked so effectively that panelists tapped their cigarettes and pipes against them, unaware of the effect they were having.

Murmurs of approval and then laughter swept through the audience as Lee told of applying one of the principles of DP — redundancy — in preparing for the conference. Three separate sound systems — two for audio and a third on videotape — were used to capture the comments of all participants. The audio and video tapes will be kept for subsequent use by scholars, and edited versions may be made available for purchase by interested parties, he said.

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Editorial

FCC Should Survey Users

Hardly a day goes by during which some government official does not invite comments from the public on pending issues. The Federal Communications Commission (FCC) spokesmen are no exception in that they urge users to speak out on important questions whenever the opportunity arises.

Inevitably, pleas for more input are made by FCC staffers at industry conferences such as the recent meeting of the International Communications Association. At these conferences, all parties agree that the user's viewpoint must be heard and many promise position papers.

Some large users do take the time to get involved with regulatory affairs but most give this type of effort rather low priority. However, the federal bureaucracy can be rather intimidating and some don't know where to begin in what appears to be only a time-consuming effort.

It therefore becomes clear that regulatory agencies such as the FCC bear an obligation to actively seek out the opinions of the regulated.

If the FCC really wants an objective overview of user opinion on a specific topic, there is nothing to stop it from surveying the people from which it wants to hear. In the private sector, especially among consumer-oriented product vendors, somebody is always quoting survey figures to back up product popularity claims.

Admittedly, surveys can be overdone. But in a controlled environment, and conducted under the direction of the FCC staff, a phone or mail poll from a government agency would be hard to ignore — especially if a user's business interests were affected by the issues being surveyed.

In the past, the FCC has gone to third-party consultants for its studies such as those on economic impact. But these investigations are usually complex.

The FCC needs a director of public opinion who could make up 10 specific questions to be asked in a brief phone call or in a short questionnaire.

The FCC will probably claim it has neither the time nor the resources to undertake such a program. But the commission must be brought more in touch with the views of those who subscribe to regulated communications facilities.

Communications issues are becoming too wide-ranging to allow the same vested interests to continually bend the ears of government regulators.

As the commission deals with issues that will affect the DP and communications areas for years to come, it is hoped that user surveys will be implemented. The same users who have a stake in the decisions being made are the taxpayers who underwrite the government. Surely they would welcome a simpler method of expressing their views.

'. . . The DP Department, What Else?'

Data Past

Five Years Ago
June 20, 1973

WHITE PLAINS, N.Y. — IBM expanded the capabilities of its 3340 disk storage subsystems to allow users to intermix the newer storage with 3330-type disk subsystems. In addition, IBM added three other features to the 3340 to provide additional flexibility for 370 virtual users.

— — —

NEW YORK — A school board election using computer-prepared voting lists was challenged in the State Supreme Court here on grounds that some citizens were denied their right to vote. The list was substituted for a file-card system which contained the signature of each of the city's registered voters. In the conversion process, some voters' names were omitted, and those who were who came to vote without proper identification were turned away.

Eight Years Ago
June 24, 1970

EAST ORANGE, N.J. — Computers should not be part of an image-making display for their owners, according to Joseph Wasserman, president of Computer Audit Systems, Inc. "When so many groups are anticomputer, it is deliberate carelessness to make a showpiece out of a DP center," he said.

— — —

WASHINGTON, D.C. — The first of perhaps 500 computer programs was approved for patenting under the Bernhart-Fetter policy of the U.S. Patent Office. That policy, reached in November by the Court of Customs and Patent Appeals, said that computer programs could no longer be automatically rejected by the Patent Office. Shortly thereafter, a "notice of allowance" was given to applicants Walter D. Bernhart and William A. Fetter.

Letters to the Editor

Disappointed About Omission

Software House was disappointed at the omission of our System 1022 data base management system from the excellent series of data base articles by Ronald G. Ross [CW, May 22, May 29].

System 1022 is classified as an inverted data base management system with support for interfile relation, according to the table and list of criteria in Ross's first article. System 1022 runs on all models of Decsystem-10s and Decsystem-20s under the Tops-10, Tops-20 and Tenex operating systems.

System 1022 was released in 1973 and is installed at dozens of sites in the U.S., Canada and Europe. It is also available for use on the major commercial time-sharing systems.

Eugene Shklar

Software House
Cambridge, Mass.

'User' vs. 'Customer'

"Close Encounters of The First Kind: Technician vs. User" [CW, May 15] was a winner with one exception. It includes the word "user" 36 times and never once uses the term "customer." If DP personnel are ever to achieve their zenith of effectiveness, this thinking must change.

"User" connotes an ill-informed individual who has been permitted to avail himself of the wonderfully sophisticated, state-of-the-art, space-age technology we have created. Users are to be tolerated and are frequently a nuisance.

"Customer," on the other hand, connotes a person or department that is paying for products and services, but only for so long as they are to his satisfaction. A customer enjoys the option of taking his business elsewhere in the event his supplier cannot adequately address his needs.

In dealing with customers, the supplier must use salesmanship and express himself in terms they understand. Customers keep suppliers in business, enable them to collect paychecks and feed our families. They must be catered to and are "always right."

James E. Rushing

Chicago, Ill.

Disagrees With Distinction

We disagree with the main inference of "Desktop Computer, Mini Differ Widely" [CW, May 8].

We feel it is possible for a system to be both a desktop system and minicomputer system. The General Robotics Corp. MVT/X3 is such a machine. It is the first of a new breed of desktop-sized computer systems that bridge the gap between conventional desktop computers and minicomputer systems.

The article's accompanying table that was meant to point out the differences in systems does in fact support our claim. It is apparent from it that the MVT/X3 is able to meet the criteria of a desktop computer and yet be easily expanded to meet the criteria of a minicomputer system with the addition of terminals, disk and communications — all the usual peripherals of a larger minicomputer system.

Digital Equipment Corp.'s very successful RT-11 operating system has simple Basic for desktop-style operation at one end of the spectrum, ranging to Fortran IV, Pascal and APL at the other. To this we can add a time-sharing executive that allows 10 users simultaneous use of RT-11.

David F. Stubbs
Vice-President
Marketing

General Robotics Corp.
Hartford, Wis.

Reader Commentary

Story of 'Flops' Points Out What Not to Do

By Ronald B. Smith
Special to CW

Once upon a time there was a system design project called Field Labor Operational Payroll System (Flops). Flops started out as a good project, but ended up as a lemon and is still hobbling along. The purpose of this article is to show how things can go wrong and what lessons can be learned from them.

A division of a large conglomerate manufactured copying machines. The division's headquaters was located next to the conglomerate's headquarters. This division had branch offices in all of the major cities in North America. Each branch office had a terminal that was part of the conglomerate's communication network, which was hooked up to the main computer.

All the branches hired maintenance people from the local union to maintain its customers' copying machines. Each union had different pay rates and fringes for each job classification.

The scope of Flops was to transmit the mechanics' weekly work data from the branch terminals through the conglomerate's communication network so that the mechanics could get paid. Flops would also produce labor distribution reports.

Project Log

Following is the sequence of events during the systems development process of Flops:

January 1975. The feasibility study began and a user project manager, a user project leader and two part-time analysts from the DP department were assigned to the project.

May 1975. The recommendations from the feasibility study were approved by the users and the systems design began. The entire project was to cost $50,000.

October 1975. The division elected a new president.

November 1975. The analysts gave a design presentation for the users. The president rejected the systems design because the turnaround time of the communications network was too long. The project was put in a hold position, and all work on it stopped.

March 1976. The systems design began again with a new cast including a user project manager (president), a user project leader and a full-time analyst from the DP department.

April 1976. The DP department upped the project price tag to $100,000 and set a completion date of Dec. 31, 1976. Also, the DP department decided for the sake of saving time to have programming concurrent with systems design.

May-September 1976. The following events took place during the redesigning and programming phase:

- The user project leader (president) was too busy with the normal duties of his office to be actively involved with the project.
- In effect, the new user project leader was an interface between the users at the local branches and the analyst. The user project leader spent more time designing the system than gathering the requirements. Also, the requirements were forever being changed. Many of the controls the analyst wanted were diluted or deleted by the user project leader.
- For reasons unknown, the programming manager didn't like the analyst. This created a difficult internal environment for the analyst to work in.
- The scope of the project was enlarged.
- Because of the other factors and the fact the analyst was trying to meet the implementation date of December 31, the analyst's interpersonal relationships became strained.

October 1976. Systems design was completed on schedule.

November 1976. Final programming estimates were made. For the second time, the cost of the project was raised, this time from $100,000 to $250,000. Also, the implementation dates were changed from December 31 to the following June 30. The users became very unhappy and as as aftermath, the analyst was replaced with another analyst from the DP department.

February 1977. With the start of system testing, many problems were encountered.

July 1977. Testing and parallel runs were completed and the system was implemented.

August-December 1977. The following took place:

- The users were still modifying the system.

(Continued on Page 24)

The Human Connection

Small Businesses Can Hit Snags With Large Clients

By Jack Stone
Special to CW

There must be literally thousands of us small business people in this industry, rushing about from one job to another. And, quite frankly, it's a great life.

At least most of the time. Occasionally, we run into situations in which we become frustrated, and they always seem to be related to the failure of certain large customers or prime contractors to meet commitments.

I don't think these few organizations really have malicious motives or insidious incentives toward small business, but I must say it sometimes appears that way.

Here are several examples from my own experience. Many months ago, I completed a long-term contract for a firm well-known in the industry. Despite my repeated billings, I have yet to collect a small balance of my fee, *plus* reimbursement of expenses I incurred on the firm's behalf nearly a year ago.

In another case, a major electronics firm called me in to handle a crash consulting job which was to span almost a year.

Partial payments were scheduled at various points along the way. However, because of the customer's archaic purchasing and accounts payable systems, I never received one dollar until after the job was completed.

But compared with the experiences of David Collins, I've had smooth sailing. Just read his story, which I've extracted from an article in the *Wall Street Journal*:

Collins is president of a small electronics firm by the name of Computer Identics, Inc. The company's major product is an optical scanner for the railroad industry. It is positioned alongside railroad tracks to identify cars by reading coded labels fixed to the side of the car.

The Association of American Railroads (AAR), which represents a majority of companies in the industry, was impressed with the device all the way back in 1967. Over the years, around $150 million was spent by the industry setting up Collins' scanners and attaching labels to keep watch over the rolling stock, according to *Wall Street Journal* estimates.

Unfortunately, the association recently voted to scrap its requirement for color-coded labels because the system using the scanner does not work well enough to continue its support. The problem did not appear to be in the scanner; rather, the consensus seemed to be that the problem resulted from the labels.

Because the environment is dusty and dirty and sometimes contaminated with fumes from corrosive chemicals, the labels

(Continued on Page 22)

The Taylor Report

'Terminal Booths' Would Benefit Occasional Users

By Alan Taylor
Special to CW

Recently I looked through the list of offerings by computers connected to the packet-switching network operated by Telenet. The impressive catalog showed that users can gain quick, cheap access to systems that provide bibliographic information, process financial data and handle architects' needs as well as mundane business applications.

Telenet had just introduced a new flat-rate tariff which, while it does have some volume discounts, is much better organized for the occasional or small-level user. The network had taken the tariff to the Federal Communications Commission for the normal approval and I was checking to see just what impact it might have.

One of the entries in the catalog interested me because it specifically said it caters to occasional users. Looking at this and looking down the list of offerings, I found that a few actually restricted the access to large organizations. In some cases, this is reasonable because of professional affiliations. A good case, for instance, can be made for requiring a certain level of expertise in providing some types of professional services.

However, often the weakness that requires such restrictions is in the software or in the manuals themselves. In fact, with regard to networked time-sharing services, generally we are at about the same stage as packaged programs were some 10 years ago — they succeed when you work really hard with them, but very frequently they just aren't worth the trouble involved.

Impulse Markets

But this is not necessary. As any check on available systems indicates, there is a great deal of possible "impulse buying" for information, processing, education and training. All of these markets are actually accessible at the end of anyone's telephone and at very reasonable charges per call. Of course, the total charge isn't simply the connect charge or the network charge. In addition, there are the data base royalty charges — and that is where a major part of the problem lies.

Normally, these charges start with some form of contract — three months, six months, etc. — and single step charge in the range of $500 or more. Of course, this $500 buys many references and many uses of the data base, but is this really necessary?

Why can't the public buy a single use of a data base on an as-used basis? Why can't we have the equivalent of telephone booths, "terminal booths," set up in each office of any network system and paid for by credit card

(Continued on Page 23)

DPers, Managers Need Broad Career View

By Dean A. Slone
Special to CW

Outside of their field, DP personnel run up against many barriers to advancement that are craated by tradition, company reporting structure and by the DPers themselves.

The original DP professional was, by necessity, technically inclined so he could "communicate" with the early computers. These people came, and still coma, from every educational discipline — finance, engineering, math and the arts and sciences. The only requiremant DP made of them was that they be able to think logically. Their management skills were ignorad under the prime directive to "get something we can use out of that thing."

Historically, computers in America are an outgrowth of the early unit record equipment and as such are looked upon as very fast accounting machines. The direct result of this line of thought is that computer facilities and personnel have traditionally been assigned to the financial operations.

By its nature, financial managament must go into all araas of a company in order to extract the information necessary to perform its function. Problems can arise when DP attempts to perform its function for areas other than finance while reporting through the financial arm. For example, a manufacturing process system developed under direction of finance has a good chance of becoming a price/cost system that does not fulfill the naeds of manufacturing.

Realization by management that DP is not simply financial reporting and number crunching but an information resource, with definite and unique functions, would help to establish it as a more viable career path to general management.

Reader Commentary

Those business professionals who have chosen DP as their entry career and wish to go beyond it also have to do thair homework. They must be willing to go back to school and seek out training in the management sciences.

Those who wish to branch out into general management will not make it because they know about computers but bacause they hava bacome involved in the developmant of systems ralating to a broad ranga of business issues and because they were willing to obtain knowladge beyond their technical expertisa.

Slone is o senior DP onolyst on tha corporote stoff for Emhort Corp. in Formington, Conn.

ICL Responding to U.S. Users' Needs

By G.D. Rowett
Special to CW

"Cross Took ICL Through 'Awe-Inspiring Years' " [CW, May 8] presented a confusing account of International Computers Ltd.'s [ICL] European operations that, unfortunately, leaves a reader somewhat bewildered about ICL's activities in the U.S. The following should help clarify for CW readers ICL's goals and direction in America.

ICL is a British-owned, worldwide corporation with offices in 83 countries and manufacturing plants in three continents, employing 33,000 people, with revenues exceeding $750 million. It is the eighth largest computer firm in the world (by almost any measure) and the largest outside of the U.S.

The growth pattern of tha computer industry clearly shows that demand for large and small systems is increasing faster than that for medium-size units. For this reason, ICL acquired the System Ten and 1500 series of small computers from Singer Business Machines in 1976.

This acquisition formed the foundation for its U.S. operations. Also, the former Singer product line was operationally similar to ICL's other products and used the same terminal-oriented approach to solving business problems.

ICL's U.S. policy is to supply system services to the marketplace and to improve its products continually to meet market requirements. One such step was its purchase of a 20% interest in Computer Peripherals, Inc., a firm jointly owned by ICL, NCR Corp. and Control Data Corp. This operation develops and manufactures more advanced, efficient printers, disks and tapes, some of which are already being used in ICL products.

Just a few months after acquiring the Singer System Ten, ICL took this product a significant step further by introducing the 220 series, which offers improved performance and greater expandability.

In summary, ICL is in the U.S. because no world-class computer supplier can afford not to be here if the firm wishes to grow and develop. ICL has the experience of nearly 70 years in the business equipment market and in systems applications.

Rowett is president of the marketing division of ICL, Inc. in E. Brunswick, N.J.

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Businesses Hitting Snags

(Continued from Poge 21)

often were not clean enough to be read accurately. One railroad reportad a correct read rate of only 80% where 90% was deemed necessary to make the system economically justifiable.

When the AAR dropped the system after a decade of Collins' efforts, Collins entered tha courts, charging that certain elements of the industry "conspired in restraint of trade" to keep the automatic car identification (ACI) system from permanent operation.

Specifically, Collins is suing Southern Pacific, a railroad holding company, and Strong Wishart & Associates, a consulting firm in the railroad industry, alleging that these two organizations had a conflict of interest as related to his scanner. Seems as though Southern Pacific has 80% ownership and Strong Wishart 20% of a firm namad Tops On-Line Services, Inc., which markets a railroad car identification and control system known as Tops. Collins claims that ACI and Tops are competitiva.

Back in 1974, the U.S. Railway Association (Usra), a nonprofit corporation set up by Congress to develop a rail plan for the eastern U.S., let a consulting contract to recommend a freight car control system. The *Journal* noted, "Computer Identics says Usra had plenty of consultants to choose from but chose Strong Wishart, even though it knew that Strong Wishart had a financial interest in Tops On-Line Services and thus a conflict of interest in advising on a freight-car-control system for Conrail. As it happened, Strong Wishart recommended a system incorporating Tops and failed to mention ACI systems as even a possible option."

The *Journol* want on to say "Computer Identics also charges that Southern Pacific used its position wilhin tha AAR to create doubt as far back as 1975 as to whether the trade group would continue to support ACI."

Computer Identics petitioned the Interstate Commerce Commission to force the railroads to maintain their ACI labels, but was turned down. The company is now appealing.

Southern Pacific and Strong Wishart deny all of Collins' charges.

'Amused' at Misinformation

User Recalls Days of Univac I at Census

By Louis A. Benton
Special to CW

When reading "Smithsonian Sparks Memories of DP Roots" [CW, May 8], I was sparked to remember the old elementary school game of whispering a word down a row of students to see what came out the other end. I am sure the misinformation contained in the article provoked more amusement among those of us who were around at the time than the intentional humor.

If Anthony Constable was accurately reporting Dr. Merzbach's information concerning the Univac I, he has crushed my fondness for an institution at which I spent many boyhood days. I feel compelled to correct those errors for which I have some firsthand knowledge.

The Univac I at the Bureau of Census had absolutely nothing to do with paper tape. Except for operator I/O, the Univac I used only magnetic tape for I/O.

In reality, the Unityper was a key-to-magnetic tape unit, a device which became popular when it was reintroduced about 20 years later. It finally caught on because there were enough "naive" computer users who lacked the sophistication to know how important punch-card unit records were to business. (But then, IBM couldn't educate everybody). The Unityper was for input only.

Printed output was originally generated by the Uniprinter, a magnetic tape-to-typewriter device which was agonizingly slow. Imagine filling up 200 pages of data at about 10 char./sec!

There was also an on-line typewriter for control output to the operator.

'Card-to-Trash' Unit

For the bulk of data input, we all fondly remember a card-to-tape unit (less fondly referred to as card-to-trash) which, when it worked, was used to transfer data from punched cards to magnetic tape for input to the computer.

The "very low density" of the Uniservo was 50- and 100 char./in. It is a shame Dr. Merzbach did not mention the excitement the Uniservo would generate when the nylon fishline used to string the tape path pulleys would break and the resultant loss of servo control would cause the tape to go shooting off the spool at full speed.

Reader Commentary

Maybe someone else can help you more precisely, but my recollection is that a full-sized tape held about 800 ft of tape and weighed more like 10 lb. A smaller tape, used with the Unityper, was probably about 200 ft of tape.

It might be of interest that the heater switches on the console were used to energize heaters that precisely regulated the delay of data through the mercury tanks that served as the only CPU memory. Data was stored in these tanks as ultrasonic waves.

Benton is president of Stoff Computer Technology Corp. in Del Mor, Colif.

Booths Could Aid Net Users

(Continued from Poge 21)

or in cash on a per-call basis?

I think these "terminal booths" could be provided without any changes in the regulations if the network owners would simply invest in one "public" subscription to each of the data bases (or to enough of them so that some form of public service could be provided).

I am sure there would be enough demand across the country for use of the New York Times Information Base or the Bibliographical Retrieval Services (to mention two at random) to support the $1,000 or $2,000 investment.

How about it? I see a great deal of benefit in having services available on a reasonable per-call basis. Wouldn't "terminal booths" be in the public interest?

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'Flops' Story Demonstrates What Not to Do

(Continued from Page 21)

- The internal auditors audited the system and were very unhappy with the loose computer controls and the absence of the noncomputer controls.
- Top management wanted to know why the project cost so much, why it took 2-1/2 years to implement, why the system was still being modified and why the overall controls left a lot to be desired.

Learning From Flops

If the project has pre-agreed deadlines and those deadlines are continually being pushed back, the chances of success will be minimal. The project should also have realistic implementation dates.

The users play key roles during the systems development process. To be really effective, the user project manager has to have the time to be involved. He can't reverse roles and play the part of designer while the analyst gathers the user's requirements.

The users can make the difference between a good or bad system design.

If the analyst who designs the system is working under a "tight implementation schedule," it might be better if he were the test analyst because of his familiarity with the system. This could also shorten the testing phase.

Otherwise, especially from an auditing standpoint, it would be better if the system designer and test analyst were different people. For example, the user could be the test analyst. In addition, the analyst should be the type of person who doesn't allow extreme pressures to get the best of him.

The internal auditing department should be involved in all phases of the development process. This should help educate users and impress upon them the importance of good controls.

A project will become unstable if there is a large turnover of users and analysts working on the system. The continuity, interaction and transfer between the phases of a project will usually not be compatible. This also leads to much duplication of effort.

Concurrent programming with systems design on large projects has its benefits and drawbacks. The main benefit, if everything works, is saving time. The main drawback is that the analyst may change some of his specifications on something that has already been programmed.

Because of changes in the business environment, there will be changes in the original requirements of the project. Because of changes in the technological environment, there will be changes in the project's design. The point is, the longer the duration of a project, the more unknowns and corresponding costs will be encountered.

The DP department should produce a systems development process (SDP) pamphlet for the department, management and current/future project users.

SDP is a structural approach to building information systems. The SDP is simply a sequence of rational and logical thoughts and actions regularly used by everyone in making decisions.

The SDP is an essential tool for increasing your contribution in project planning and development and ensuring project success.

The point is that the user has to be educated in his role in the SDP, his decision points and his risks.

The DP department should produce a standard control form to be signed by the user if he wants changes to his requirements during the SDP. In this way, the user and DP department will have documentation on one of the reasons why a project might go over its original cost.

The DP department currently has four or five phases in the SDP. This lumps a lot of activities into a single phase. The number of phases should be expanded or have individual steps within each phase.

Also, it would be much easier to cost individually more phases or steps within phases. The following phase descriptions could be used:

- **Definition Phase.**

a. Initial Investigation. This step identifies the problem or opportunity and determines the need for further study.

b. Preliminary Systems Study. This step provides an economic evaluation and first definition of the proposed system. The economic evaluation includes the "ball park" costs of designing and implementing the system along with the operational costs of the current and proposed system.

The first definition describes all major features of the proposed system. The study includes the scope, objectives and constraints. It identifies, evaluates and recommends alternatives and plans the next step.

c. Systems Analysis. This step describes the proposed business system in user terms. It provides a business solution to satisfy the user's requirements, assures that a technical solution can be developed and plans the next step.

- **Development Phase.**

a. System Design. This step describes the proposed business system in technical terms that detail the logical system. It also develops plans for conversion design and user procedures. The conversion design builds a bridge from the current to the new system. The user procedures prepare the users to operate the system. The next step is planned.

b. Programming. This step defines the programs and the modules within the programs and translates each module definition into machine-executable code. Finally, the programs are tested individually and as a complete system.

- **Implementation Phase.**

a. Testing and Installation. All aspects of the business system are tested to the satisfaction of the user and data center in a "live" environment.

b. Project Evaluation. The system is reviewed as to how well it meets user business objectives. Recommendations are developed for upgrading the SDP. This review should take place one to six months after the system becomes operational.

All projects $25,000 and more should utilize the Project Evaluation and Review Technique or the Critical Path Method approach starting with the preliminary systems study.

On big projects, more work and the corresponding costs should be spent up front during the preliminary systems study than is done for small projects. If not, the big project could exceed its budget, extend beyond its implementation dates and be poorly designed.

Just as planning of a project must take place at two levels, so must budgeting. A firm budget is developed and a commitment made for the next step or phase.

As the project proceeds, the estimate range narrows. Management is not asked to commit resources for the complete project until a clear picture of the solution is available. A complete solution might be clear after the first step, or it may take the first four steps within the SDP.

Since it is his system, the user must be made to realize he has to have complete responsibility for the controls. All too often, the user doesn't know all the controls and doesn't even realize he should be responsible for them.

The analyst in the example couldn't impress upon the user project leader the importance of good controls being built into and around the system. The analyst shouldn't try to mediate or correct a situation over which he hs no control. In short, it might solve nothing and create ill feelings.

Most working people report to one master. They are paid to take orders and are not responsible for what they do.

An analyst has two masters — DP management and the users. Sometimes the analyst is told to do things by DP management that are not in the best interests of is users. Since the analyst represents the users, it's his responsibility to let his management know of the possible consequences.

If DP management decides to take no action on the situation, then there is nothing else the analyst can do. Therefore, he must not be put in the position of trying to serve many masters. More often than not, the requirements or rules of the different masters could be in direct conflict with each other.

Flops was missing one main ingredient that brings stability to a project. That is loyalty — loyalty to each other and to the project.

No single person or event brought much harm to Flops. But as one can see, the combination of people, time and events can contribute to implementing a poor system.

Smith, who has a degree in accounting, is a senior systems analyst at Carrier Corp. in Syracuse, N.Y.

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NCC Panelists Agree

Data Base Design Defies Automation

By Don Leavitt
CW Staff

ANAHEIM, Calif. — There are tools under development to simplify and improve the design of data bases, but all the panelists at a recent National Computer Conference session here on data base design methodology admitted their research projects — even if they work out as well as they hope — will not completely automate the design process.

"We plead guilty," Prof. Dennis G. Severance said. "We haven't solved the entire problem. We still have to know what the user is trying to accomplish."

The work he has under way at the University of Michigan can help the designer/analyst to recognize what factors have to be considered in planning a data base. But, he added, it's more to help the analyst avoid bad design options than to show what design would be the best.

Earlier he reminded the attendees there are five basic factors that have to be considered: the hardware environment, a logical data description, each of the users' transaction profiles, design constraints and, finally, the software environment.

Design Problem Complex

None of these are terribly hard to describe, the professor noted, but the way they interface with each other make the design problem one with great complexity.

There are many criteria typically used to define what benefits are wanted from a data base system, but they generally can be narrowed down to nine, according to Severance. The first three — response time, storage requirements and maintenance requirements — can be quantified and therefore easily measured, but the others are increasingly qualitative and therefore subjective, he said.

System development cost comes closest to being measurable before the fact, "but how can you measure data redundancy, data security, reliability, flexibility, or simplicity?" he asked.

(Continued on Page 26)

Option Eases CICS Coding

NORWALK, Conn. — The Message Management Feature (MMF) now available as an option with the Key/Master package from Turnkey Systems, Inc. is said to simplify the creation of on-line applications in an IBM Customer Information Control System (CICS) environment.

MMF removes all CRT formatting and editing from an on-line application program. Display formats are created in an interactive session using Key/Master's Format Description Facility, a spokesman explained, emphasizing no programming knowledge is needed to build new formats.

Formats and editing criteria can be tested for usability long before any coding is begun, and the resulting on-line programs need only perform the relatively simple functions pertaining to data manipulation, he continued.

MMF makes every on-line program smaller, easier to write and more efficient, the spokesman claimed. All incoming data is edited by MMF before any application logic is invoked and error messages are returned to the terminal operators without application processing.

As a result, demand for both system resources and response time is minimized, the vendor asserted.

Previously developed for and still available with Turnkey's Task/Master teleprocessing monitor, MMF requires no change in either the on-line control or the operating software.

With MMF, editing of incoming messages is more than simple presence/absence or type-of-data testing. Fields may be generated, operated upon arithmetically, range-tested, verified against on-line tables or certified as having a valid check digit, according to the spokesman.

Nearly every validity test short of actual checking against a data base can be performed external to the application program, the spokesman stressed. Users have reported savings of better than 50% in the time needed to create new applications as a result of using MMF, he claimed.

MMF costs $14,000 or $390/mo. Key/Master's Data Entry Feature [CW, Feb. 12], costs $12,000 or $265/mo, Turnkey Systems said from 111 East Ave., Norwalk, Conn. 06851.

N.Y. Conference to Compare DBMS

NEW YORK — The four-day National Symposium on Comparative Data Base Management Systems (DBMS), to be held here next week, will provide attendees with the opportunity to hear presentations, see demonstrations, ask questions about and evaluate all the major DBMS now available, according to AMR International, which is sponsoring the conference.

On Monday, June 26, George Schussel, vice-president of American Mutual Liability Insurance Co. and a long-time observer of the DBMS scene, will open the meeting with a presentation on the problems and opportunities facing the data base world.

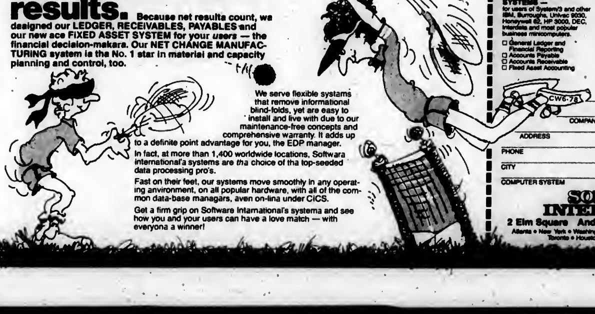
After that, individual vendors will offer technical discussions of their products and, in many cases, demonstrations through terminals. Schussel noted the roster of presenters includes technical representatives of all the major suppliers, as well as some speaking for new and relatively unknown products.

Unlike some conferences, this one will not provide attendees with any precompiled cross-reference guide to product capabilities. Material such as that takes a long time to gather and is often out of date as soon as one vendor puts out a new release, the symposium leader explained.

The products on display will come from hardware vendors such as Burroughs Corp., Control Data Corp., Honeywell Information Systems, Inc., IBM and Univac and from software houses such as Cincom Systems, Inc., Cullinane Corp., Computer Corp. of America and MRI Systems Corp.

Representatives from Infodata Corp., Informatics, Insyte, Mathematica and International Data Base Systems Corp. will also have time at the podium, along with people from minicomputer firms such as Data General Corp. and Prime Computer, Inc. and firms with products related to data base, such as MSP, Inc. with its Datamanager, Schussel said.

Scheduled for the New York Hilton hotel, the conference costs $395/person. Further information is available from AMR International, 1370 Ave. of the Americas, New York, N.Y. 10019.



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'Impact' Simplifies Financial Models, Reports

MORGANVILLE, N.J. — Impact from MDCR, Inc. is said to enable the professional, non-DP manager to define application requirements and to use a computer as a tool to build reporting systems, perform analyses and design financial models.

Impact is available on various remote computing service networks or as a package for installation on IBM, Itel Corp., Amdahl Corp. or Univac mainframes that support virtual storage. Both interactive and batch versions are available, MDCR noted.

The software supports all three major reporting categories — planning/forecasting, "actuals" and control — so users can match future objectives with resources, opportunities and goals, on the one hand, or highlight where actual operations deviated from expectations, on the other, a spokesman noted.

Impact is said to allow the user to communicate with the computer through English-like phrases, business terminology and simple mathematical expressions in order to create a variety of financial and marketing applications.

Described as a self-contained product having its own report generator, model builder and editor and execution and testing commands, Impact supports customized reporting and formatting, built-in business and forecasting functions, "what if?" analysis capabilities and multireport processing in a single run.

A general-purpose plotting package designed to show data graphically on an interactive terminal or line printer is included. Impact also provides the ability to produce histograms from data contained in a model.

Written in PL/I and Assembler, Impact runs under IBM's Conversation Monitor System (CMS) or Time Sharing Option (TSO) in the interactive versions and under IBM's OS/VS and compatible operating systems for batch work.

The time-sharing version is available for $39,500 or $1,250/mo; the batch version costs $32,500 or $1,000/mo. Use of the software on a remote network can be arranged through MDCR, P.O. Box 29, Morganville, N.J. 07751.

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DOS Accounting Eased

PITTSBURGH, Pa. — The Westinghouse Electric Corp. Job Monitor/II was designed for use on an IBM 360 or 370 operating under DOS or DOS/VS that supports the IBM job accounting option, a Westinghouse spokesman said. The package interfaces with the DOS or DOS/VS supervisor to store accounting information accumulated for each job step.

It also merges supervisor and Power/VS accounting records into a complete, unified file, he added.

Job Monitor/II edits the collected records to ensure the validity of the data and produces a series of operational and center management reports, utilizing the processing day as the basis for report breaks, the spokesman noted.

Reports generated by the package enable the user to check operations from virtually any perspective. In addition to chronological listings, there are summary reports by job utilization and phase utilization as well as multiprogramming histograms.

Job Monitor/II costs $3,500, including documentation and the first year of maintenance. The subsequent annual maintenance charge is $350, the vendor said from 2040 Ardmore Blvd., Pittsburgh, Pa. 15221.

Design Still Proves Problem

(Continued from Page 25)

"We can easily estimate the data base will require X amount of storage — and that has a value — but how satisfied can we be if we know the data hasn't been stolen in 15 hours?" he asked again.

Severance said his project creates a design data base for the analyst. It includes a data base edit routine that validates the description of his wants, a hardware environment calibrator and an existing file analyzer.

But it also includes a number of algorithms. The data encoding algorithm shows what fields are used in printed output and that can be an important factor.

Most fields are never printed, so they can be compressed and never need to be decompressed — saving a lot of space, he said.

In his presentation, Prof. Toby J. Teory described the creation of a data base design evaluator which he said is written in Fortran and is "fairly transportable" from the Honeywell Information Systems, Inc. IDS setting in which it was developed to any Codasyl-type environment.

The objectives of the evaluator are to provide resource utilization and elapsed-time estimates, a trade-off analysis for alternate designs and sensitivity to major parameters; it leads toward an optimization of the physical design, he added.

The models it creates allow a number of data base features to be evaluated, Teory said, adding that "any access" via a logical data base structure, currency, distribution of record types and sizes and basic physical parameters are among the things that can be modeled.

It misses a number of factors, he said, but the net effect is that users can sense which of several possible designs will probably be best. In one case, he noted, his staff found choices that were orders of magnitude more cost-effective than the original design.

Panelist R.R. Brown of Hughes Aircraft told the professors he was impressed with what they had done, but he was also disturbed. Neither approach took into account the fact that a data base should be a model of whatever enterprise was using it, he said.

Beyond that, he added, there is an implication that the real world is static and that one design would be best for all time — and that's just not the way things are."

Ansi Mumps Offered by DEC

MARLBORO, Mass. — Designed for use on mid- and large-scale Digital Equipment Corp. PDP-11s, Digital Standard Mumps (DSM-11) is said to be a complete implementation of the Mumps language specifications sanctioned by the American National Standards Institute (Ansi) last year.

A data base-oriented, high-level programming language originally developed at Boston's Massachusetts General Hospital, Mumps has been adapted by a growing number of users to commercial as well as medical applications. The DSM-11 package includes a Mumps interpreter, an operating system and a hierarchical file system, DEC said.

DSM-11 requires 32K words of memory and one of DEC's disk subsystems, with a minimum 7.5M byte capacity. Additional disk storage and I/O devices are supported.

Digital's Standard Mumps is available under license for $16,500.

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Blindly Following Piper? — Part 1

User Programming Sounds Good — But Flawed

By Charles A. Gravitt
Special to CW

The idea of distributed programming or "personal computing," presently being pushed by some hardware vendors, envisions programming being done by individuals in user departments as a sideline to the performance of their primary missions.

That sounds simple enough, but the pitfalls and long-range perils to the user's business need to be studied and analyzed before blindly following this latest piper's tune.

Summary acceptance of the disperson of corporate computer responsibility without first examining its ramifications could require substantial, unforeseen capital outlays in the future to attain the same level of computer service previously attained with centralized resources.

Reasons for Caution

First, it is important to focus upon the premises on which the recommendation for caution is based:

- DP is a corporate resource and does not enjoy an immunity to things fiscal and real. It is a direct operating cost item which requires funding and must produce a cost-effective product within limits of return on investment.
- DP exists for what it can do for the corporation, not for a mission of its own.
- It is generally more economical to have specialized forces produce specialized work products for end users. This is fundamental in the American assembly line productivity system; it is the reason why products are assembled by components and the reason why we have repairmen, accountants, printers and others dedicated to producing one work product per trade.

One could suppose that personal computing is perhaps an extension of the "do-it-yourself" philosophy currently in vogue. However, a corporation composed of many specialists, each doing a job contributing to the corporate objective, must be careful to fully understand the effects of upsetting the deliberate separation of duties which, acting in concert, produce the corporate product on time.

Programmer Selection

The personal computing concept encourages the hypothesis that "anyone" can program and use the computer. This overlooks one of the paramount considerations in achieving productivity and positive return on investment in data processing.

This sort of thinking is comparable to the idea that everyone has the capability to become a jet mechanic; it completely ignores the fact that not everyone has the ability or inclination to be a skilled mechanic.

Personnel selection for data processing is the most important factor in ultimately securing a high level of effective programmer productivity. It sets the tone for everything that happens later.

Candidates must possess the ability to think logically and systematically and must have good abstract reasoning and critical judgment powers. Some argue that these qualities are innate to a large degree, and a student trainee can improve only a relatively constant amount above his own beginning level.

Many companies spend hundreds of dollars using intelligence and aptitude testing, sometimes by outside professionals, in selecting a single programmer candidate. This is done because experience has shown that only a few people in a hundred members of the general population have the interest and aptitude to become a truly successful and productive programmer for the corporation.

On an obvious note, the very basic test for potential programmers is called the Programmer *Aptitude* Test (PAT).

The point is that the designation of persons to program in user departments after a terminal is installed has sometimes been rather naively cavalier. People have been selected randomly to program.

Being good at one's regular job does not mean one will be a good programmer. This random approach does not guarantee that the personnel selected to write programs will even rise above mediocrity.

In fact, unless one is extremely lucky, mediocrity or at least some inefficiency is virtually assured.

The intrinsic interest in a new toy sometimes overrides user department personnel's attention to their regular duties. This creates a constant problem for management.

Managers responsible for data processing, whether it be central or distributed, have a perpetual duty to make sure documentation standards, programming conventions and other records are observed and maintained in such a way that the systems upon which the corporation relies can be adequately supported in the future.

Documentation Need

The capability must exist for another person to carry on the work of someone whose services are lost without having to re-create what has been done or spend too long studying a system to find a problem.

This is just not possible without complete and adequate documentation. One of the things that can hurt a corporation most is the inability to support the programs upon which it has come to rely.

The more personal computing sites there are, the more this problem is compounded.

Gravitt, an attorney who served on the DP Study Staff of then-Governor Jimmy Carter's Georgia State Reorganization and Management Improvement Study, has more than 10 years of DP management experience. In his next article, he will detail some of the ways in which the support problem is compounded by personal computing.

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NATIONAL **—SPECIAL LEAR SIEGLER ISSUE—**

INFORMER

June 19, 1978

PROJECT X AWES THOUSANDS AT NCC

Inside! Exclusive Interview With VDP-1000
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Autograph Hounds Mob Dumb Terminal At NCC.
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ADM-31 & 42 Discuss Their Roots
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Project X Perpetrators Still At Large
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At-home Interview With Garry Strohmeyer
Page 5

★ ★ ★

Electronics Pundit Says of Project X: "I Don't know of Anyone but LSI Who Could've Pulled it Off"
Page 35

Surging crowd of excited onlookers deluge Lear Siegler's NCC booth, hungrily pressing forward to grasp at more information on Project X.

INFORMER PHOTO

Lear Siegler, Inc., forced by overwhelming pressure to declassify its super-secret Project X, is still reeling from its staggering success at the NCC.

The Project X wonder devices, revealed to the public for the first time at Anaheim Convention Center, left thousands speechless. LSI's booth was at times so crowded that it was difficult to get even a brief glimpse of the devices, causing hundreds to queue up around the display. Heightened security in and around the booth tried valiantly to stem the human tidal wave, but finally gave up its efforts as futile.

The ADM-31, ADM-42, 300 Ballistic Printer, VDP-410, and VDP-1000 are the devices that the wizards at Project X labored on so long and so strenuously. And by the reactions from people in the crowd, they were well worth waiting for.

Glenn deYong, an intense, bespectacled free-lance science writer, told INFORMER reporters that the ADM-31 was "...the most eagerly-awaited terminal of the year." Richard Sturm, a doctoral candidate at the Rhine Institute in Germany, said of the VDP-1000: "There's practically nothing you can't do with it. It's fantastic. And the price is so affordable." Of the new VDP-410, fashion model Karen Herbert said, "It's a true building block for just about any system you want to put together."

From this smattering of on-the-scene reactions, it should be clear that Project X's success at the NCC eclipsed even LSI's well-founded expectations of dominance. Attendants at many other surrounding booths could only gape, stunned, as conventioneers flocked to booth #1519 in proverbial droves. Reports that the booth was partially dismantled by overzealous fans are highly exaggerated, however.

Originally hatched in secrecy to insure their domination of the NCC, LSI's Project X was for weeks the subject of intense curiosity and lingering rumors. The INFORMER's relentless campaign to expose the project then ended in the unexpected move by LSI to open Project X to the public. The entire array of wonder devices was instantly applauded; and the success at the NCC has left LSI and the computer world breathless.

And now, with its declassification and brilliant victory at the NCC, Project X is history. The wonder devices, secreted for so long behind locked doors, are now out in the open and ready to go to work. And the INFORMER, true to its pledge to follow Project X to the end, has comprehensive information on all of them.

For complete details, just turn the page. And remember, you read it first in the National INFORMER.

LEAR SIEGLER

ADM-31 Proves 2 Pages Are Better Than One

The ADM-31 is a low-cost, high-reliability desktop CRT with full editing, formatting and *two pages of display.* Not as an option, but as standard equipment. Which means the ADM-31 affords twice the display potential of terminals costing up to twice as much. And that's a pretty clever idea.

The ADM-31 is completely self-contained, with a keyboard, control logic, character generator, refresh memory, and interface. What's more, it incorporates a microprocessor which augments its reliability while making it even easier to use. Block transmission and *protected fields* are standard. And the terminal also comes with a printer port option, if you require printouts along with your readouts.

The ADM-31's amazing 90-key keyboard is actually capable of more functions than are now available on the ADM-1. What's more, the keyboard itself is integrated with the main logic, and is capable of generating all 128 ASCII characters (upper and lower case, numerics, punctuation, and control). Among other things, it features an integral numeric pad, with period, comma, tab, minus, and numerals arranged in a familiar calculator format. And it also includes a caps lock key (to lock the keyboard into upper case display).

The ADM-31's editing capabilities let you clear the screen, or use a destructive cursor for a character change. Read and load cursor permits sensing of the current address, and direct, absolute addressing to any X-Y coordinate. The controls let you skip protected fields, backspace, forespace, move up, down, return, home, and new line. And you can store the Control Characters, and they'll display as a reverse image.

The ADM-31 comes with *character insert/delete*, line insert/delete, erase to end of line/field/screen, and back tab. All standard equipment. The ADM-31 can also clear to protected spaces, clear to unprotected nulls, and set and reset copyprint.

Who says a machine can't edit?

Project X's new ADM-31 desktop CRT, seen here with 90-key keyboard and Caps Lock Key. PROJECT X PHOTO

Project X's amazing new ADM-42 is a semi-intelligent terminal designed for a host of computer-related tasks. PROJECT X PHOTO

ADM-42 All But Thinks For Itself

The ADM-42 is a semi-intelligent terminal that gives the user flexibility of format, security, editing, interface, and transmission. Like the ADM-31, it features a full two-page display as standard equipment. And it also comes with an optional extended memory capable of adding data space in 2-page increments up to a maximum of 8 pages.

The terminal boasts a bright, easy-to-read, 2000 character display, a full 128 ASCII character set, 16 function keys for 32 separate commands, and five separate cursor control keys. You can also order an optional Programmable Function Key feature that lets you define the function keys. An alternate character generator with line drawing set is also optionally available.

The ADM-42's status displays on-screen disclose a wide range of information at a glance, and special symbols indicate the entry of all control characters in memory. The ADM-42's Field Protect Mode also allows rapid data entry into forms or instruction pages.

Like the ADM-31, the ADM-42's displayed data is formatted in 24 lines per page, with 80 characters per line. In addition, it offers something the ADM-31 doesn't. It has an 80 character 25th line, established and reserved exclusively for status indicators, or special messages.

An additional special capability of the ADM-42 is Field Blanking/Underline. You or the computer can designate areas of the display as blanked fields, and the designated areas are then blanked from the display. Or an Underline attribute may be substituted for Field Blanking by switch control.

With Field Blinking, you or the computer can designate areas of the display as blinking fields. These areas of the display will then blink on and off.

And with Reverse Field, you or the computer can designate areas of the display as reverse images. These areas of the display will then reverse on and off.

The ADM-42, like all LSI products, is upward compatible. That means when you upgrade to the ADM-42, you don't worry about rewriting your software, or replacing any other peripherals. Just plug the ADM-42 into the system you've been using all along.

You'll discover this terminal is a truly efficient, cost-effective step upward that'll enhance your system out of all proportion to its price.

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The 300 Series Ballistic Printer is a low-cost, 180 cps printer with a built-in microprocessor that gives you 15 switch-selectable form lengths, 15 perforation skip over formats, and full horizontal and vertical tabulation control. Space and blank character compression. Interface control for serial, parallel, or polling and addressing operations. Plus a nonvolatile forms retention system that retains these programmable settings when power to the printer is turned off.

The 300 Series has a character buffer that's optionally expandable to 2048 characters. With the 2048 buffer, the printer can fully buffer a 1920 character CRT screen of data without waiting for the screen to transfer to the printer on a line-by-line basis. And the buffer affords quick dumps of full 1920 character CRT screens.

Like all LSI Ballistic Printers, the 300's dependability and negligible duty cycle restrictions originate with its ingeniously simple, patented Ballistic print head. It actually operates without moving cores attached to its print wires. Instead, it uses small armatures that propel its matrix wires in free flight to the platen.

The 300 Series comes with a full 96 ASCII character set, with up to 128 printables optionally expandable to two sets of 128. The printer has, in addition, an elongated character capability, and 10 pitch with 12 and 10/16.5 dual pitch options.

This printer isn't built just simply. It's built simply to last.

Project X's new VDP-410 does just about anything you want it to do.

PROJECT X PHOTO

Project X's 300 Series Ballistic Printer must be seen to be believed.

PROJECT X PHOTO

VDP-410 An Intelligent Building Block

Meet the VDP-410.

It's a low-cost, 16-bit CPU with enough speed and ports to support a variety of peripherals. It provides OEMs with the flexibility to configure a multitude of systems. From communications controllers without external storage capabilities, to sophisticated time-sharing systems with a string of terminals, printers, and disks.

The 410's DMA channel provides easy expansion. You can even get a cable and an expansion chassis with five slots for 15" cards and a hefty power supply. LSI also offers a disk controller and 10-megabyte disk that complements its entire line of terminals and printers.

The basic system consists of a CPU with 200 nanosecond instruction cycle time, and 16-bit, 32K word memory with a 250 nanosecond access time, and I/O capabilities for communication with three external devices. The CPU, by the way, also includes an expansion port with serial/parallel I/O capabilities.

The VDP-410's instruction set, memory organization, and I/O architecture are compatible with hardware made by Data General and other manufacturers. Operating systems, file management systems, and programming utilities are available from leading software houses as standard packages, so it doesn't take any custom configuring to please the VDP-410.

The VDP-410's instruction set is Nova* compatible, and provides memory access, arithmetic, logical, and I/O functions. It's augmented with load/store-byte, inclusive/exclusive OR, exchange accumulators, multiply/divide, and block mode. And this offers the OEM an incredibly powerful instruction set for tasking and data management.

VDP-1000 A Complete Small Data System

The VDP-1000 actually features many attributes commonly associated with larger systems costing many times more.

Attributes like BASIC, COBOL, and ASGOL programming languages for business and system applications. A virtual memory operating system (VMOS) that lets you develop stand-alone or segmented programs without regard to physical memory size. And up to 40 megabytes of disk storage capacity. You start with a choice of two disk systems and three languages, and configure your system from there.

The basic VDP-1000 consists of a 16-bit CPU, 32K, 16-bit words of dynamic RAM, the world-renowned Dumb Terminal,™ a 180 cps, bidirectional 300 Series Ballistic Printer, and either a 10 megabyte cartridge or 1.25 megabyte floppy disk. All of the electronics, CPU, memory, and disk come in a full-size, wood-grain desk that leaves the surface clear for the console and printer. And there's also convenient work area for the operator.

Once you have the basic system, you add additional storage as you need it. Or want it. Up to four 10 megabyte disk drives or 5 megabytes of floppy capacity. You can upgrade the console with a choice of five smart terminals. And you can add a second or even a third programming language as your needs change or multiply.

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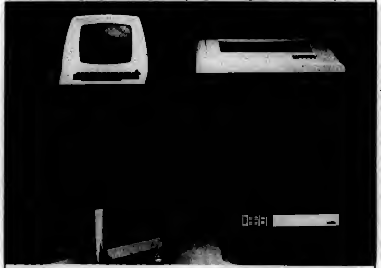

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Infotech Reports on Structured Analysis Efforts

PENNSAUKEN, N.J. — *Structured Analysis and Design,* a two-volume state-of-the-art report, is now available from Auerbach Publishers, Inc. in conjunction with Infotech International.

The report examines recent work done on systems and software development techniques, focusing on the stages between problem definition and the actual design work.

These intermediary stages are said to include requirements analysis, requirements specifications, data structures creation and the selection of criteria for problem decomposition.

Other topics addressed by the report include the economics of software development, documentation and representation techniques, computer-aided design techniques, requirements engineering and structured design costs and benefits, Auerbach stated.

The report also features invited papers with titles that include "The Technique and Practice of Structured Design, a la Constantine," "Input/Output Tables in Structured Design," "Requirements Problems in Large Real-Time Systems Developments," "The TOPD System for Computer-Aided System Development" and "Software Design Using Softech's Structured Analysis and Design Technique (SADT)."

Structured Analysis and Design is the first of eight reports in the 1978 Computer State-of-the-Art Reports Series published by Infotech International. It costs $260.

The entire series is priced at $1,470 and can be ordered from Auerbach at 6560 N. Park Drive, Pennsauken, N.J. 08109.

'TSS' Eases Access to RDOS Capabilities

BOULDER, Colo. — Designed for use under Data General Corp.'s unmapped RDOS environment, TSS, the time-sharing system from Polymorphic Computer Systems, Inc., supports up to eight simultaneous terminal users, giving each independent RDOS capability, a Polymorphic spokesman said.

Each user has independent access to RDOS and can run Fortran, Algol, Basic or Assembler programs. System activities supported at the terminal include program development, compilation or assembly and execution.

Beyond that, TSS is said to allow a user to detach from a running program and to switch to a different time-sharing line. This "virtual user line" feature allows a user to control several simultaneously executing programs, the spokesman noted.

TSS requires 32K bytes of memory and one of several choices of DG communications hardware. The Polymorphic package is available for $3,500 from P.O. Box 3581, Boulder, Colo. 80307.

'Secure' Guards Vsam Data Sets

SUNNYVALE, Calif. — The capability of supporting IBM's Vsam has been added to Boole & Babbage, Inc.'s Secure data access security system. Release 1.1 of Secure is said to provide protection from theft, alteration, disclosure and other abuse of Vsam and standard OS data sets.

Secure has always supported standard sets, but Boole & Babbage decided to add Vsam support to the system in view of Vsam's increased popularity, according to a spokesman.

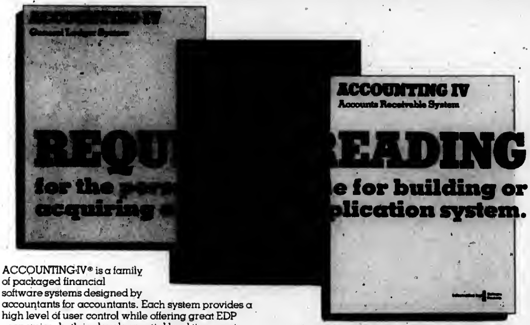
Secure costs $12,600 for one CPU with a 50% discount for a second CPU and a 75% discount for a third CPU at the same site, Boole & Babbage said from 510 Oakmead Parkway, Sunnyvale, Calif. 04086.

Tape Manager Linked To CICS for Queries

NEWPORT BEACH, Calif. — Tfast/VS, the tape management system from Tower Systems, Inc., has been enhanced. Features added with Release 6.0 include on-line query and update via IBM's CICS of the tape library file, a spokesman said.

A recorder file which supports recovery and an audit trail of all tape-processing activity is also part of the package, which runs under Software Pursuits' DOS/MVT or Computer Software Co.'s Extended DOS as well as under IBM's DOS/VS, the spokesman said.

Tfast/VS costs $6,500 or $225/mo for 12 months, Tower noted from 3901 MacArthur Blvd., Newport Beach, Calif. 92660.



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NCC Panel Points Out

Common Method for Local Nets Lacking

By Ronald A. Frank
CW Staff

ANAHEIM, Calif. — Local area data networks have great potential, but little work has been done in this area to develop common approaches, a panel at the recent National Computer Conference here agreed.

Although many similarities exist between global and local networks, local systems possess some distinct features, according to Ira Cotton of the National Bureau of Standards, who chaired the session. One major distinction of local networks, which are those that connect a limited number of sites in a campus environment or within several corporate locations, is that the user maintains total control.

In a global network, the user has access to a public facility and has to operate within the structure set up by the carrier; in a private net, however, the user can tailor the protocol and other parameters to meet his specific requirements, Cotton explained.

Some type of standards will have to be developed for local nets, he said, although this may not be an issue with which standards-making bodies will get involved. At the least, a local network protocol should be developed so it will be attractive for vendors to produce in chip form, Cotton said.

David Mills, senior scientist at Comsat, reviewed the available technologies that can be implemented for local networks. These include satellite links; short-range radio using shared frequencies, such as the Aloha network in Hawaii; and the possible use of certain scanning lines within the raster of TV signals.

The TV option relates to Line 21 of the TV raster, which has been used for digital coding in several new applications, Mills said. Another option is the use of power systems in buildings, which are one of the most readily available sources and can provide up to 10K Hz bandwidth for local distribution purposes.

Layered Approach

Speaking on potential protocols that could be used for local nets, Stuart Wecker, a member of the research and development group at Digital Equipment Corp., said a layered approach similar to that of X.25 would probably lend itself to local nets.

Some of the characteristics that would be required in a local net that are common to other nets include end-to-end addressing, a transport mechanism such as virtual circuits or datagrams, guaranteed delivery of messages, sequencing and flow control, an interrupt facility and failure recovery mechanism, Wecker said.

The more unique attributes of local nets include high bandwidth requirements, low delay and a short packet lifetime, an absence of errors, the ability to be tailored to an application, high network usage, central management and a high level of interconnection, Wecker said.

Although the layered approach provides a good framework, current standards are not optimal for use on local nets, he added. The second or data link level should be more simple than X.25, since it is probable that many messages will not have to be handled at any one time. A small sequence number

(Continued on Page 37)

Vested Interests Seen Thwarting Regulation of Communications

By Ann Dooley
CW Staff

ANAHEIM, Calif. — Attempts to regulate the telecommunications industry are difficult because of the tension, confusion and reluctance of some groups to relinquish the status quo, according to members of a panel at the recent National Computer Conference here.

Philip Nyborg; panel chairman and president of the Computer & Communications Industry Association (CCIA), said in an outline of the current federal regulatory environment that the Federal Communications Commission (FCC), the U.S. Postal Service and the banking industry compose the three regulatory jurisdictions whose functions overlap and are often at odds with each other.

The growth of what is called "electronic mail" has increased these overlaps, Nyborg noted. The term "electronic mail" is inappropriate since it really doesn't mean anything, he said.

The term does, however, presuppose that such systems would be under the jurisdiction of the post office; a better term to use would therefore be "electronic message systems," Nyborg contended.

Tensions are apparent between the Postal Service and the FCC in the jurisdiction of mail and electronic message systems, he said. Although mail was once completely under the jurisdiction of the post office, the mailgram moved the total jurisdiction away from that branch, he noted.

Congress should act on the complex issues involved in this regulation problem, but so far it has not. The post office, in the meantime, is developing its own system to avoid letting in any competition, he said.

Several smaller companies are about to develop electronic message systems, including both hardware and software, but they are hesitant to proceed before some regulatory decisions have been made, according to Nyborg.

Another area of overlapping authority is between the post office and the banking industry, Nyborg said, because of the large numbers of paper transactions that take place daily.

A third area of jurisdictional overlap oc-

(Continued on Page 36)

Harris' IBM 3270-Type CRT Among Product Debuts at NCC

By Marguerite Zientara
CW Staff

ANAHEIM, Calif. — Numerous communications-related products were introduced at the recent National Computer Conference here. In addition to IBM 3270-compatible terminals introduced by other vendors [CW, June 12], Harris Corp. showed its 1670 distributed processing system and its switchable 3270-type CRT terminals for the first time.

A typical configuration including processor with console, 150-card/min card reader, 300 line/min line printer, two or three key stations, 6M- or 12M-byte disk drive and two communications links (one batch and one interactive) would sell for $1,500, according to a spokesman.

Three Winchester-type disk drives for the Harris 1600 series of distributed data processing systems were also shown for the first time. The units provide increased on-line storage capacity and performance for remote-batch processing, data entry, source document entry, inquiry/response and local batch processing, a spokesman said. A 12M-byte disk drive costs $8,008; 24M-byte, $10,120; and 80M-byte, $28,160.

In addition, Harris introduced a 1,000 line/min chain printer with 64-char. set. The Model 1653 impact printer is said to offer

(Continued on Page 34)

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Harris 3270-Type CRT Among NCC Debuts

(Continued from Page 33)

printing speeds from 730 line/min with 96-char. set to 1,200 line/min with 48-char. set. Alphanumerics, Ebcdic and Ascii chains are available and standard line width is 132 characters. The printer is priced at $34,760.

The Harris Series 500, shown at NCC, consists of the S550 and S570 vitual memory systems. The S550 can reportedly support 48 interactive terminal users, while the S570 can support 64 interactive terminal users. With Vulcan operating systems, each can perform concurrent time-sharing, multistream batch, remote job entry and real-time processing. The S550 costs $225,000 and the S570 costs $376,000.

Harris also introduced a multiuser APL language that allows the use of data files created by other languages, the firm said. File I/O is managed by a system function that provides data management and manipulation abilities outside APL workspaces, a spokesman said. Harris APL will be available for a license fee starting in the fourth quarter.

Harris introduced the S123 entry-level system including virtual memory CPU, with 144K bytes of MOS memory and 768K bytes of virtual address space, operator's console, 40M-byte storage module disk drive, 9-track 800 bit/in. tape drive, 300 line/min printer and a communications processor with a choice of either four asynchronous ports or one synchronous port. It can reportedly satisfy the needs of eight interactive users. Price for the system is $120,000.

Digi-Log Systems, Inc. showed its so-called "brilliant" terminal system, Microterm II, with software capabilities including multitasking, Isam, diskette file control, sort, IBM 2780 and teletypewriter communications emulators, utilities and an enhanced interactive software development system. Microterm II is a desktop workstation including dual microprocessor direct-memory-access architecture with up to 80K random-access memory, 24 by 80 line CRT, program keyboard and single or dual minidiskettes with up to 784K bytes of storage. A typical dual diskette configuration sells for $4,950 in quantities of 100.

Digi-Log also showed the DLM II tape trap data line monitor that provides programmable unattended monitoring techniques for fault isolation. It is settable to record one track (250K characters) and stop; record the whole tape (1 million characters) and stop; or record continuously in an endless loop format, the firm said. Prices start at $3,000 for the rack-mounted DLM II.

Megadata Corp. introduced its Model 700 Universal Emulating Terminal System (UETS) developed for users of large numbers of computers and terminals. The 700/UETS is a programmable intelligent terminal containing a 12-bit microprocessor, a 15-in. diagonal display screen and a 126-station keyboard with up to 71 function keys, 12 status indicators and an audible alarm. It has one basic operating procedure and reduced maintenance complexity, according to a spokesman for the firm. The unit with an intelligent terminal with 32K memory, dual floppy disk and a 55 char./sec printer sells for $14,500.

Teleprinter Debut

Centronics Data Computer Corp. introduced the Model 765 KSR and Model 765 RO teleprinters at NCC. Features include a bidirectional "logic-seeking" print head, a 1K RAM data buffer, tabbing up to 600 char./sec for any space of 10 characters or more and a blank field skip capability. Transmission rate is 1,200 bit/sec. Standard features include 96-character Ascii set, operator-selectable 6- or 8 line/in. vertical feed, 15 in./sec slew rate, adjustable tractor feed and full- or half-duplex selectable operation.

The KSR unit sells for $2,975 and the RO is priced at $2,800.

Intelligent Systems Corp. (ISC) introduced its Intecolor 8080 development system, equipped with 19-in. color CRT, eight foreground and background colors, 48 line by 80 char./line format, an Intel Corp. 8080 microcomputer, one RS-232C serial port and editing features such as Erase Page, Erase Line and Page Roll Mode. Also standard is 110 char./sec bidirectional impact matrix printer, an external dual minidisk drive with 160K bytes of data storage and a 2708/2716 programmable read-only memory/erasable programmable read-only memory programmer, the firm said. The unit costs $6,500.

ISC also introduced the Intecolor Series I business systems, models 8070 and 8071. Both have an 8080A microprocessor, 48 line by 80 char./line format, eight-color background and foreground, 110-char./sec bidirectional impact printer and an external dual 8-in. floppy disk drive. The 8070 has a 19-in. color CRT while the 8071 has a 13-in. color CRT. The 8070 costs

(Continued on Page 37)

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DL/1 Runs 'A Dozen Systems in One' for Portland

"Our OCP service has built Portland into one of the largest shipping ports on the Pacific Coast."

Gabriel Vallicelli, director of finance and administration for the Port of Portland, Oregon, explains that Import Cargo Distribution/OCP (Overland Common Point) refers to the common point of entry of freight en route to widely separated inland destinations.

"For shippers using the service, we act as their inventory managers and physical distributors in the U.S. We break down their container loads, warehouse their goods and ship to their destinations over much of the U.S.A.

"Many of our biggest shippers could use other Western ports at the same freight rates, but our OCP service saves them money by relieving them of those chores here."

The port agency has placed control of inventory and physical distribution for OCP operations on its computer, using Data Language/1-Entry (DL/1-Entry), a data base management system for smaller IBM System/370 installations.

"The huge variety of products we handle presents us with difficult system design and implementation problems. One shipper identifies merchandise by serial number; another follows a 'first-in first-out' policy and specifies goods by volume or weight. The structure of each inventory record and bill of lading is different, and some of them change frequently. It's like running a dozen different inventory control systems in one."

The system was designed so that personnel can query the data base in the System/370 Model 125 from a terminal to answer a customer's questions about a shipment. It can identify the truck carrying it and tell him where that truck is. The system is currently being expanded to identify the location of items in the warehouse.

DL/1-Entry allows for handling variable-length records and such wrinkles as breaking up a shipment and "drop-shipping" or delivering directly to customer's customers.

Without reprogramming, by using simple data-base entries, handling of any customer's inventory can be changed to add or remove data segments from his record structure.

"Since OCP is a marketing tool, special service to the customer is vital," Vallicelli notes. "We've attracted business that used to reach the East by the Panama Canal. In fact, we have so much OCP business that we have built a $14 million warehouse just to handle it.

"Yet, even without counting all the additional containers it has attracted to Portland, OCP is earning money for us now as a separate profit center."

Computer Designs and Fabricates Computer Circuits

Today's high-speed, high-capacity computer systems depend on advanced electronic devices using Large Scale Integration technology. This microminiaturized circuitry puts thousands of memory or logic circuits into a space a quarter-inch square or less, making possible speeds of billionths of a second.

At IBM's General Technology Division facility in Burlington, Vermont, the computer itself is instrumental in the design and production of these advanced semiconductor devices. Engineers there are using a System/370 Model 168 and IBM 2250 Graphic Display Terminals to design and produce the high-precision photo-masks that are critical to the fabrication of integrated circuit "chips." Intricate patterns are successively overlaid using a lithographic process to build a finished chip containing thousands of individual memory cells.

To create a tentative design for a mask, an engineer draws lines with a light pen directly on the face of a graphic display terminal connected to the Model 168. The system automatically resolves the sketch into a precise pattern of straight lines and geometric shapes.

"It's easy to move elements around on the screen, trying alternative layouts until we find the optimum use of the space available on a chip," says Paul Serednicky, manager of computer-aided graphics. "We can rapidly try so many alternatives that we are finding much more efficient layouts than we ever could manually on a drafting board.

"Since the finished device usually consists of one memory cell pattern repeated many times," Serednicky adds, "the engineer can develop it once in detail. The system then replicates it the required thousands of times, automatically rotating it, generating mirror images and adding interconnections.

"Perhaps most significant, though, is that the computer generates a tape that guides automatic production of the mask itself in the final size. Previously, we had to draft the design by hand, and then use it as a guide in the preparation – also manual – of an oversized mask.

"Any change forced us to start over again from the beginning and repeat the manual process. Now we can go back at any time and make a change or improvement in the mask design. We can accommodate an engineering change in minutes instead of weeks."

When computer-aided design of the integrated circuit chip is complete, a computer-driven plotter draws a three-color layout of the circuit in large scale.

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DATA PROCESSING DIVISION

Vested Groups Thwarting Communications Regulation

(Continued from Page 33)

curs between the banking industry and the FCC since the issue of who will regulate electronic funds transfer (EFT) has not yet been resolved.

There is a real problem in changing regulatory jurisdictions in areas that have traditionally been regulated by one certain agency, Nyborg admitted, but a public policy needs to be made.

Nyborg suggested a policy to the audience which he devised for the jurisdictional regulation disputes. Monopoly practises should no longer be extended, he said, and the forthcoming electronic message systems should be open to competition and not just fall under the post office.

The post office should not be the developer of those systems or underlying systems, he added.

Since regulatory uncertainty has caused several companies to hesitate before developing these systems, it is important that the government minimize regulations and make them more coherent as soon as possible, Nyborg said.

Phil Walker, president of Telenet and another panel member, outlined several proposals that have recently been brought before Congress to regulate the common carriers. Although competition traditionally has played a minor role in telecommunications, various changes have occurred to open up the industry somewhat, Walker said.

But "Ma Bell" complained about these changes to the FCC and, when this failed, took its case to the courts, where it failed again; it ended up taking it to Congress, where it died last year, Walker noted.

The Consumer Communications Reform Act, commonly known as the "Bell Bill," was promoted as a consumer bill but would have been a disaster to competition, he said.

Computer Inquiry II

Prof. Donald Dunn of Stanford University described the Computer Inquiry II bill on the FCC docket which would apply to carriers involved in transaction network services. The unregulated firms, excluding both underlying and resale carriers, offering services such as electronic mail could be considered carriers and be subject to tariffs under the bill, Dunn said.

Most of the major carriers object to the idea since it would mean major changes in the ways carriers offer their services, he said. The FCC is expected to decide on the bill very soon.

NCR Series Includes Special Basic

ANAHEIM, Calif. — A special version of Basic is included with a series of intelligent terminals introduced by NCR Corp. at the recent National Computer Conference here.

The NCR 7500 series can be implemented as a formattable data entry system, media converter or freestanding user-programmable processor, according to a spokesman.

The series offers a version of Basic, known as NCR Basic +6, designed as a medium for user-developed, cassette-based business applications.

Three models are offered in the series: the 7510, 7520 and 7530, all of which include 20K bytes of user-available memory, upgradable to 24K bytes.

The series offers optical character recognition (OCR) Type A font. Merchandise tags printed in that font can be automatically read by NCR scanning devices at the point of sale, the spokesman said.

An expanded 7500 system including a processor with 24K bytes of user memory, flexible diskette, magnetic tape unit and 125 line/min printer costs $28,100 and can be rented for $814/mo under a five-year rental agreement.

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Common Approach to Local Nets Seen Missing

(Continued from Page 33)

would probably be adequate in this regard, he said.

The use of contention mechanisms seems to be feasible and simple; fast hardware — probably implemented on an integrated circuit chip — should be utilized, Wecker suggested.

The network or third level may be more complex than current standards and some type of dynamic addressing scheme would probably be required. The need for data security would be application-dependent and, for the most part, simple broadcast mechanisms would suffice, he said.

Local Characteristics

Local network application characteristics were discussed by Gary Donnelly of Interactive Systems Corp., who said users will want to have 24-hour availability and will need to know when scheduled maintenance is to be performed.

It will also have to be determined whether files can be damaged, especially during periods of limited network availability, he pointed out.

The local net should be totally transparent to users and control characters should be transmitted through out-of-band signalling so data bandwidth is not impacted, Donnelly said. Different failure modes will have to be implemented because while global nets tend to fail locally, local nets fail globally, he noted.

The possibility exists that multiple local nets will eventually be interconnected, according to Richard Sherman, principal research engineer at Ford Motor Co. Such internetwork connections can be implemented through network schemes.

The gateways will have to be familiar with the total topology of the nets they are handling. They will need to retransmit packets through some type of address filtering scheme to be sure messages are routed correctly, he said.

Path-building functions, flow control and error control should be included in the gateway capabilities, according to Sherman.

The NCC panel was based on a meeting held in 1977 at the National Bureau of Standards. A paper discussing the conference and the work being done on local data networks is available in a publication entitled "Local Area Networking" that is available from the Government Printing Office, Cotton said.

CRTs Make NCC Debuts

(Continued from Page 34)

$7,000 and the 8071 costs $7,500.

Ramtek Corp. introduced two systems at NCC, the 6110 and 6310 Colorgraphics computer terminals. The systems feature modular, microprocessor-controlled architecture and teletypewriter-compatible interfacing. The family is upward- and downward-compatible in software, options and peripherals, according to the firm.

Ramtek's resident control software supports the communications interface, keyboard and joystick and incudes a teletypewriter emulator and graphics language interpreter.

Options include graphics subroutines and patterned vectors, according to the firm. All communications with the host computer are serial asynchronous and in the form of printable Ascii text strings.

The 6110 is priced at $5,500, and the 6310, designed for high-resolution applications such as scientific research and computer-aided design, sells for $25,000.

These Hewlett-Packard terminals are compatible with all the major interface standards and work with computers from a range of manufacturers. They come with full HP support, service, training, and documentation.

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Two Functions on One Chip?

VLSI Eyed as Future CPU Memory Key

By Howard A. Karten
CW Staff

ANAHEIM, Calif. — Very large-scale integration (VLSI), in which 5,000 or more gates are placed on a single chip, will have an almost unimaginable impact on future microprocessors and CPU memories, according to speakers at a recent National Computer Conference panel here.

Speaking before an overflow crowd, Dr. Frederico Faggin of Zilog Corp. noted the cost of solid-state devices has been steadily and significantly decreasing, even while their capacities and capabilities have been increasing. Faggin expects this steady price drop to continue into the 1990s, with a concomitant decrease in power dissipation, physical size and propagation delay.

Citing a typical example of the price drop, Faggin said gates, the most basic element of large-scale integration (LSI), cost approximately three cents each in 1971 but now cost approximately 10% of that. Typical gate densities are now in the range of several thousand, Faggin pointed out, predicting that 10,000 gate/chip densities will be a practical reality in the next few years and that 1985 will see densitites of 45,000 gate/-chip.

SOS Wave of Future

Limitations imposed on current technology by physical phenomena may mean that silicon-on-sapphire (SOS) technology is the wave of the future, the Zilog engineer said. These limitations include the problem of channel length, which is currently limited by hot electron phenomena to .25 microns in length; problems involving supply voltage, which is currently limited by thermal noise to .3V to .4V; and gate oxide thickness, which is currently limited by oxide breakdown phenomena to 100 angstroms.

Two additional limiting factors, Faggin said, are minimum line width, also currently limited by MOS technology to .25 microns in length, and power dissipation, currently limited to 1 watt at a frequency of 100 mHz.

SOS technology has several advantages over current CMOS methods, Faggin said, but cost is not one of them. While propagation delay for SOS is only half that of MOS, the cost is three times as much.

Possibly offsetting this, however, are the power dissipation abilities of SOS, which are said to be approximately 10 times that of MOS. Nevertheless, Faggin said, he expects the more advanced technology will be highly important in the latter part of the 1980s.

Function Integration

Continuing on the theme of integration of separate functions on a single chip, copanelist Ron Whittier predicted microprocessors and memory will eventually be commonly found on the same chip.

The Intel Corp. manager showed attendees examples of chips that had been advanced technology items in 1977, when they were produced, but which he said were already obsolete. His own company has already started producing chips with memory and logic in one package.

Looking into the future, Whittier foresaw several trends in chip manufacture and design. Future trends for dynamic random-access memory (RAM) will continue to include the 16-pin DIP packaging, a single 5vdc power supply, TTL input/output and the continuation of power dissipation requirements and higher performance; the speed of dynamic RAM devices should eventually go down to the 50 nsec to 75 nsec range, he predicted.

Attempting to look into the late 1980s-early 1990s time frame, Whittier predicted chips will become standardized packages containing both software and hardware, forming the basic building blocks for the future. Program storage will exceed data storage in the future, he augured, and complete memory packages will dominate small machine applications.

Moving-Head Disk Storage Seen Stable for 10 More Years

By Ronald A. Frank
CW Staff

ANAHEIM, Calif.— Moving-head disks will continue to satisfy the needs of mass storage growth without being impacted by any new technology during the next 10 years, according to Thomas Murnan, an engineer with Magnetic Peripherals, Inc.

Semiconductor and solid-state memory technologies are expected to impact the fixed-head disk area, but they will complement the growth of higher recording densities within moving-head disk systems, Murnan predicted at a National Computer Conference session here recently.

Improvements will be made to these disk systems in the areas of recording heads, the recording medium and head positioning systems, serving to widen the performance gap between moving-head disks and tape devices, Murnan said. At the same time, moving-head disk systems will maintain a significant advantage in cost/byte over solid-state memories, he added.

There is no foreseeable innovation in moving-head disks that will reduce the cost per megabyte as effectively as increasing the recording densities, Murnan told the NCC session on future developments in peripheral devices. Future disk systems must maintain or improve performance over today's systems while at the same time reducing storage costs through increased recording densities. While this is happening, reliability and maintainability must also improve.

To achieve higher recording densities, designers must make heads fly closer, thin the recording medium and make positioning systems more precise with circuits which have better timing and encoding characteristics.

While progress is being made in the development of memory technologies such as bubble memories and charge-coupled devices (CCD), these still are not cost-effective for use in disk systems. Some moving-head disk systems will be replaced by solid-state memories, but only where the system needs the added reliability and the cost premium can be justified, Murnan believes.

In the coming years, moving-head disk drives will be available in more configurations with fixed-media drives being used mostly on medium to large systems. Removable media drives will continue to play a significant part in small to medium-size systems, Murnan said.

Nonimpact Printers

Reviewing printer technology, Donald Swatik, director of engineering with Computer Peripherals, Inc., noted nonimpact devices are receiving a lot of attention because they have the ability to print high-resolution images in a very dense dot matrix format at relatively high speeds. This combines the high print quality obtained from solid-stroke impact printers with the font versatility of the matrix format.

Ink jet printing technology generally includes the continuous ink jet and drop-on-demand ink jet types. The ink jet printer represents a modular building block that can be configured in many ways to yield a broad spectrum of printers, Swatik explained.

The number of characters printed per second varies inversely with resolution, so speed can be traded for resolution, he said.

The highest speed printers employ electrophotography and lasers. The large number of steps in this process and their relative complexity leads to an expensive mechanism, but the technology is cost-effective at high speeds, Swatik noted.

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Modeling of CPU Performance Termed Science Rather Than Art

By Tim Scannell
CW Staff

ANAHEIM, Calif.— Computer performance modeling is mistakenly considered by many DP analysts to be more of an art than a specific science. In reality, computer modeling — or comparing "what is to what should be" — is based on common methods of evaluating a computer's performance, according to Dr. Tom Giammo of the Social Security Administration.

Performance evaluation in its essence is prediction, and within DP prediction implies modeling, Giammo said at a panel here at the recent National Computer Conference. There exists a basic "underlying structure" to the operation of each computer system as it goes through the various stages of input and output, Giammo stated, and, as a result, certain approaches can be taken.

The first step is to isolate and define the individual elements of the computer's architecture. This involves treating the system as a collection of "semiautonomous components" rather than as a single machine, Giammo explained.

The analyst should follow the flow of data as it is passed through the computer and compare the speed and efficiency that each component attains as the data is transferred.

The organization and interaction of the various components within the computer as new jobs are input and the resulting priority assignments should also be recognized by the analyst and a "queueing network methodology" be adopted, Giammo said. In the area of computer performance modeling, it should become natural for the analyst "to treat the whole thing as an interacting, queuing network."

Although there are several laws that govern the physics of software and the action that occurs within the CPU, these laws have the disadvantage of being "too detailed" and performing "too slow," Giammo said. On the other hand, analytical techniques using mathematical algorithms have proved to be "very fast."

Ideally, the analyst should "do as much analytically as he can get away with," Giammo noted.

Number of Tasks

Efficient computer performance depends upon how many tasks are currently seeking service within the CPU, Giammo continued. The effective distribution of service among job classes is directly dependent on what priorities are assigned to the active list of DP jobs in the system.

To arrive at the correct assignment of the various priorities, an analyst must know the workload at each particular station — a job that, for the most part, is based on approximations, Giammo stated.

Evaluation of a system's performance must be preceded by establishing the approximate size of the computer's workload, job by job. When the priorities are ascertained, the programmer or analyst has to build specific analytical assumptions into the program.

For instance, when a Class A job enters a CPU which contains other jobs of various levels, the other jobs, instead of being preempted, will "jump ahead" a few steps and continue at a fairly steady rate of speed, Giammo said.

Dr. W.W. Chiu of IBM's T.J. Watson Research Center agreed with Giammo's contention that laws should not be taken at face value and added that computer modeling should have as its goal an accuracy rate of 15% or less, simple input requirements and fast run times.

An analyst developing a computer model must strive to thoroughly study the logic of the system involved and avoid complexity in his designs, Chiu said.

Chiu pointed out the differences between simulated computer models and theoretical models. Although simulated models have extremely high running costs because of their level of detail, Chiu said, theoretical models have at least three difficulties.

First, they require the need to analyze complex workload scheduling algorithms; second, there exists the problem of monitoring memory contention or swapping; and third, there is no way to account for the effects of different algorithms in a total system model.

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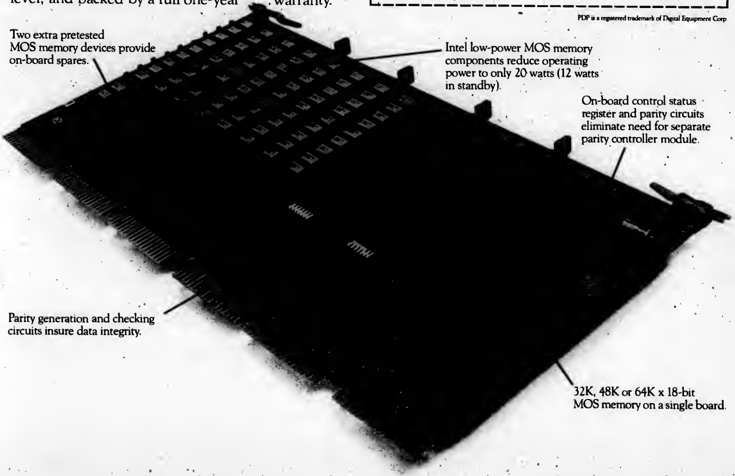

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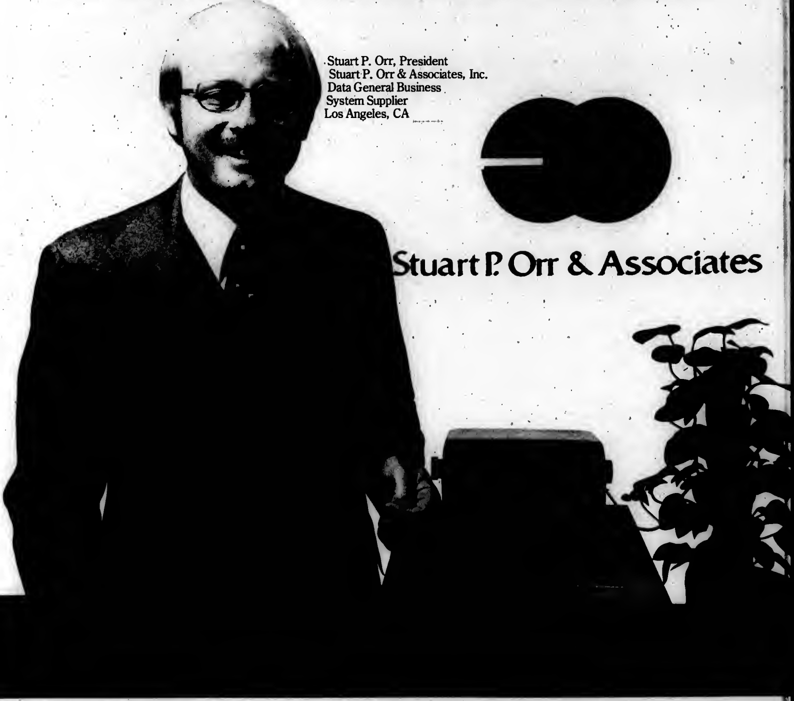

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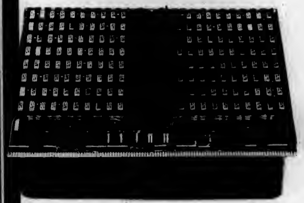

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Cummins-Allison Additions Support Check Processing

GLENVIEW, Ill. – The Cummins-Allison Corp. has introduced a family of check reader-sorters and extended its distributed data processing (DDP) equipment with what it said represents major enhancements to its line of check-processing systems.

The 6400 distributed processing system announced by the company is an extension of the 5400 system. It is faster than the 5400, according to a spokesman, and can be equipped with a maximum of 192K bytes of MOS static random-access memory.

The 6400 can support a maximum of 32 CRT keystations with concurrent data entry routines, utility programs and user-written Cobol or RPG programs, he added. Communications modes include Burroughs Corp. remote job entry protocol and IBM 2780, 3780 and 360/20 Hasp workstation protocols.

13 DMA Channels

The system, which is said to be fully compatible with the 5400, has a 400 nsec access time for 1 byte of main memory, 800 nsec CPU cycle time and a data transfer rate of 2.5M-byte/sec. It features 13 direct memory access (DMA) channels, all independent, to prevent channel queueing delays, the spokesman explained.

A maximum of 25 devices can be attached to the system, including up to two printers, a maximum of eight disks and a maximum of eight tapes (7- or 9-track, single or dual density).

Prices for the 6400 system start at $800/mo including maintenance; it carries a purchase price of $29,500.

Micr Reader/Sorters

The four magnetic ink character recognition (Micr) reader/sorters announced by the company range in speed from 830- to 1,400 document/-min. The Model 6260 has six pockets, a speed of 830 document/min and a price tag of $52,650 or $1,200/mo including maintenance.

The intermediate-speed Model 6285, with 14 pockets, has a price tag of $97,375 or $2,215/mo, also including maintenance.

The largest reader/sorter, the Model 6290, has 14 pockets and reads 1,400 document/min. A version of the 6290 is expandable to 34 pockets, according to a spokesman.

The company expects two additional features to be available for the Model 6290 in the first quarter of 1979: nonimpact printing on one or both sides of the document, fully controllable by software, and a microfilming capability.

The 6290 sells for $101,250 and leases for $2,330/mo, the company said from 800 Waukegan Road, Glenview, Ill. 60025.

Scanner/Digitizers Offered For COM Graphics Units

CHELMSFORD, Mass.— Two scanner/digitizers reportedly capable of scanning up to 240,000 point/sec and compatible with most standard computer output microfilm (COM) graphic systems have been introduced by Optronics International, Inc.

The company said its image enhancement technology enables the devices, called the Commander Model 810 and the Commander Model 1722, to produce digitized data even when working from less-than-optimal-quality graphics, such as discolored or mutilated originals.

Among the COM units with which the Commanders are said to be compatible are the Information International, Inc. Comp/80 and FR 80 and Dicomed Corp.'s D48.

Standard Resolutions

The Model 810, which accepts up to 8- by 10 in. size, has a standard resolution of 50 microns, or 500 line/in., while the Model 1722 accommodates graphics up to 17- by 22 in. at the same resolution. Optional resolutions available on both models are 12.5-, 25-, 75- and 100 microns, a spokesman said.

The Model 810, which uses both reflection and transmission, can digitize 15 graphic/hour and costs $31,550. The Model 1722 works on reflection only, taking 6.5 minutes per graphic; it costs $136,300.

A machine capable of scanning a newspaper-sized sheet is also available with a request for quotation (RFQ), the company stated.

Both devices can be used with magnetic tapes or disks, according to the spokesman, and both use data compression techniques to permit rapid scanning and minimizing of the storage media needed. In addition, both devices have color capabilities, the spokesman noted.

The Commander family incorporates automatic calibration control that is said to guarantee drift-free measurements. An additional feature is a "standard white" calibration strip for background density reference.

Optronics can provide interfaces to all standard minicomputers on an RFQ basis, as well as an 8-bit, 16K minicomputer and an 800 bit/in., 7- or 9-track tape drive, the spokesman said from 7 Stuart Road, Chelmsford, Mass. 01824.

Protective Cartridge Fits IBM 2315 Types

WOODLAND HILLS, Calif.— Data Devices International, Inc. has introduced a protective bottom cover designed to fit IBM 2315-type data cartridges.

The device, called the Guardian, is said to prevent lateral movement of the disk within the plastic, protect the cone and diaphragm by completely covering the bottom of the cartridge and minimize the possibility of contamination from dust or other foreign matter.

The product comes in boxes of six, priced at $45/box, from the company at 6301 Desoto Ave., Woodland Hills, Calif. 91364.

Hospital's CPU Dispenses Pharmacy Control

By Howard A. Karten
CW Staff

FORT SMITH, Ark. — A community-oriented medical center here has found multiple benefits in using a medium-scale virtual memory system in its pharmacy. The CPU, which keeps track of medications dispensed to patients for medical and billing purposes, has proved helpful to all parties involved — pharmacist, doctors, nurses and patients.

The Sparks Regional Medical Center is a teaching hospital associated with the University of Arkansas Medical School. In 1974, the hospital decided to apply DP in the pharmacy and began investigating systems available for that application.

Working with the hospital administrators and the hospital's director of DP, Mathew M. Griffin, director of pharmacy services, began investigating various alternatives.

"We agreed in the beginning that it would be a pharmacy-oriented system and not a system to which the pharmacy would have to conform," Griffin said, of his software search. "We wanted it designed strictly around our needs. I took a strong role in the software selection because, after looking at what was available, I hadn't seen what I wanted. I wanted a system that could be flexible."

Modification Possible

Although he found no system which he felt met those criteria, Griffin and his group felt they could obtain a workable solution by modifying IBM's Health Care Pharmacy System and incorporating the American Society of Hospital Pharmacists' Drug Product Information File. The Drug Product Information File lists all medications available in this country, along with pertinent information such as method of administration and trade and generic information and assigns a unique number to each product.

Although they began work with the IBM software, the group could not get it to work at all. "I feel it wasn't ready to be marketed," Griffin said. However, since they recognized the value of IBM's approach, they decided to attempt to modify the package to get it in production. "Our DP people felt they could modify the system and get it into production much faster than starting from scratch."

One of the major omissions of the IBM package, he added, was that it did not include the ability to process information on intravenous (IV) medications or additives to IV solutions. Although IV therapy is common in many hospitals, the IBM package could not add IV medications to the patient medication profile or do some of the relevant calculations for them.

Since the system has been implemented, Griffin feels it has facilitated all phases of the pharmacy's daily work.

One of the benefits he cited is the reduction in time nurses must spend preparing and ordering medication. "Prior to the introduction of the system, nurses spent about 22% of their time in preparing and ordering medication. The pharmacy system now generates the medication orders for each patient, at the start of each day, thereby freeing the nurses for other tasks. This time savings is one of the ways we can cost-justify the system," Griffin explained.

Another important benefit is the tighter control the pharmacy has achieved over inventory. Since each dose of medication is accounted for — by the pharmacist when entering and filling the medication orders of the physicians and by the nurses when dispensing them — pilferage has been reduced, and the hospital has achieved tighter control over narcotics.

Another advantage is in patient billing. The drug records of each patient are centralized and itemized.

A patient's contact with the system begins on admission. Information obtained during the admitting process is sent to the pharmacy, where it is entered into the system by the pharmacist. Using an identification number assigned for data security purposes, the pharmacist enters all pertinent information such as allergies, diagnosis, drugs presecribed, dosage, method of administration and any special instructions.

Since some physicians have standard regiments for particular diagnoses, which might consist of as many as 12 or 13 different drugs, these are stored in the computer with mnemonics.

Unlike similar systems in use elsewhere, the Sparks system does not have the capability of checking two or more drugs for dangerous or untoward interactions. That is presently done manually by the pharmacist. However, Griffin has plans to add that capability.

The hospital's equipment consists of a 1M-byte IBM 370/135 running under DOS/VS, 3340 disks, 3420 tapes and 3272 CRTs. In addition, it has Genesis One Computer Corp. G-77 CRTs and Genesis G-165 printers.

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Here's a *tailor-made* system to fit the requirements of your job today. In addition, BRAEGEN's multi-tasking intelligent controller offers the flexibility you will require in the future. **Systems Programmers,** in particular, find the following features very valuable.

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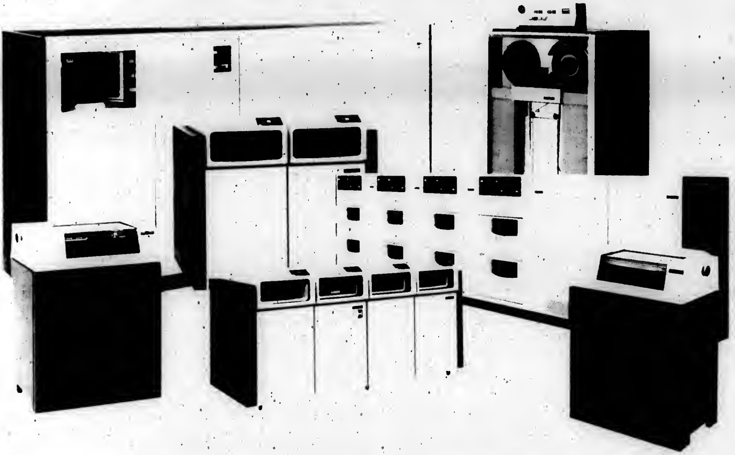

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Software Also Enhanced

Three CPUs Join Burroughs B1800 Line

By Jeffry Beeler
CW Staff

DETROIT — Burroughs Corp. has added three CPUs and an enhanced operating system to its B1800 series of systems products.

With the introductions, the B1800 family now encompasses four computer models: the previously announced B1860 and its sister systems — the B1825, B1835 and B1865.

The B1825, an entry-level system, fits in a cabinet and incorporates 96K bytes of 4K N-channel MOS memory expandable to 256K bytes, according to a Burroughs spokesman.

Compared with the low-end system, the B1835 offers 70% greater throughput as well as a 128K-byte error-correcting memory expandable to 512K bytes, the official said. A basic B1835 also comes with a 4K-byte bipolar cache memory, he added.

The B1865, meanwhile, provides three times more throughput than the B1825 and holds 256K bytes of 16K N-channel MOS memory expandable to 1M byte, the spokesman noted. Like the B1835, the top-of-the-line system also reportedly offers a 4K-byte cache.

At the same time, Burroughs also announced an enhancement to its B1800 Master Control Program. The enhancement, a memory priority management system, provides a choice of four management schemes users can select to suit their individual applications requirements.

The schemes, which range in power from First In First Out to a technique that assigns a decay factor to each code segment in memory, allow frequently used memory segments to reside permanently in main storage.

Depending on a user's job mix and CPU capacity, the memory priority management capability is said to boost system throughput 8% to 18%. The feature comes standard with the B1825, B1835 and B1865 and is available as an optional enhancement for B1860s already in the field, the spokesman said.

Operating Software

As part of the same announcement, Burroughs also introduced additional operating software and an interface for the company's Data Management System (DMS-II). With the two products, RPG users can reportedly interface their systems to a DMS-II without first having to convert their programs to Cobol.

Elaborating on the features of its latest small- and medium-scale systems offerings, Burroughs credited the B1825, B1835 and B1865 with occupying 50% less floor space and consuming 25% less power than the B1860.

Because all B1800 series systems are object-code-compatible with each other, a program written for one model can operate — without software changes — with any other member of the line, the company official said. The B1800 systems are also said to run the same programs as any of Burroughs B1700s and can operate under the Computer Management System software used by the company's B80 and B800s.

Latest Addition to B1800 Line

With the memory priority management capability, the B1825 can support up to four communications lines, compared with a maximum of 32 for the B1835 and B1865, the official said. The three systems accommodate any mix of six communications capa-

(Continued on Page 48)

At Housewares Maker

Mini Speeds Warehouse Operations

BARRIE, Ont. — Inventory that used to take as long as four days to receive and store can now be placed in stock in less than an hour thanks to a minicomputer-based control system installed six months ago at the Housewares Department of Canadian General Electric Co. (CGE).

The inventory control system has freed 6,000 sq. ft. of storage space in CGE's warehouse by allowing the housewares manufacturer to consolidate like materials, a company spokesman said.

It has also allowed the firm, which manufactures more than 150 models of household appliances, to calculate how many items of each product type can be assembled from its existing inventory of more than 100 kinds of parts.

With this information, materials managers can predict when they will have to replenish their parts inventories to keep pace with production demand.

As a result, CGE no longer experiences production slowdowns or shutdowns because of parts shortages, the spokesman said.

Switched From Card Files

Before it acquired the current system, the company controlled its inventory manually with a large card file. For each type of part it stocked, CGE maintained a card showing the amount of the item on hand and its locations in the warehouse.

Before they began production of any product, company employees searched the card files, warehouse and assembly lines to decide whether enough parts were available. In this effort, they received some help from a GE-115 batch computer, which they updated weekly to monitor the firm's inventory levels.

Unfortunately for CGE, the batch computer's weekly parts counts, while suitable for purchasing requirements, were not nearly accurate or timely enough for production scheduling, a company official recalled.

As a result, materials managers never knew whether they had enough parts to produce a useful volume of a given product. In fact, at times they had to halt production and temporarily lay off workers because they had exhausted their original stockpile of parts and could not obtain immediate replacements.

And even when they did have enough parts, managers often could not find them because CGE's previous inventory control system did not provide for a systematic arrangement of materials inside the company's warehouse, the spokesman reported.

To overcome these problems, CGE's managers decided to modernize their outmoded, manual inventory control system with a computerized counterpart. After evaluating several alternatives, the company eventually opted for a system built around a 192K-byte Hewlett-Packard Co. HP 3000 Series II.

CGE chose the HP model over rival systems primarily because other users had recommended the computer's Image/Query data base management software, the spokesman explained.

Dubbed On-line Stock Control and Receiving (Oscar), the system automatically updates its data base to reflect changing in-

(Continued on Page 59)

Get It Off Your Chest

Many users and industry officials have worthwhile things to say to their colleagues but are seldom heard because they lack an appropriate forum.

If you're one of those individuals, here's your chance to get those important opinions off your chest and out into the world where they can do some good. *Computerworld* is now seeking reader contributions for its August "Special Report on Minicomputers and Small Business Systems."

Maybe you're a user who found an ingenious small systems solution to a crucial business problem or who has an unusual installation experience to relate.

Or perhaps you're a company official with industry tips or prognostications that users should know about.

If you have something interesting to say on the subject of minis or small business systems, CW wants to hear from you — and so do nearly 90,000 CW readers.

Contributions should be four to eight double-spaced, typewritten pages long and should be submitted no later than than July 20 to Jeffrey Beeler, *Computerworld*, 797 Washington St., Newton Mass. 02160.

LSI-11 Gets Bulk Core

CRANBURY, N.J. — A bulk core system from Dataram Corp. attaches to the Q-bus of the Digital Equipment Corp. LSI-11 and PDP-11/03 and emulates DEC's RF-11 fixed-head disk system, according to Dataram officials.

Software-transparent to all DEC's standard operating systems, the Model BC-203 reportedly comes in 7-in. and 15.75-in. chassis versions that store up to 512K bytes and 2M bytes, respectively.

A 7-in. or 15.75-in. BC-203 costs $7,600 with 256K bytes and $12,400 for 512K bytes. A 15.75-in. system with 1M byte sells for $22,000, compared with $37,600 for a 2M-byte configuration.

Dataram is located at Princeton-Hightstown Road, Cranbury, N.J. 08512.

RK05-Compatible Unit Debuts

HARTFORD, Wis. — Compatible with the Digital Equipment Corp. RK05 storage system, a cartridge disk unit from General Robotics Corp. holds 20M bytes on one removable platter and three fixed platters, according to the product's developers.

The removable platter can be a 5M-byte double density platter or a 2.5M-byte RK05 platter. Built around a DEC LSI-11/02, the CD/X3 accesses in 52.5 msec and incorporates a 62K-byte MOS random-access memory, company officials said.

A serial asynchronous I/O port allows the unit to interface RS-232-, 20mA- and TTL-compatible hardware, while a 16-slot backplane accommodates an additional nine expansion slots, they added.

Empty sockets on the CD/X3's bookstrap module are said to permit the attachment of additional programmable read-only memory or erasable programmable read-only memory for expanded programming capabilities. The bootstrap module also stores firmware diagnostic programs, the spokesman said.

The CD/X3 uses DEC's RT-11 operating system, which includes file utilities, assemblers, macroassemblers, linkers and loaders, they added. The software also reportedly supports high-level languages like APL, Fortran, Basic and Dibol.

C$/X3 costs $18,000 at 57 N. Main St., Hartford, Wis. 53027.

CPUs Join B1800 Line

(Continued from Page 47)

bilities, including standard asynchronous lines operating at 1,200 or 1,800 bit/sec, standard synchronous lines operating at 2,400-, 4,800- or 9,600 bit/sec and bisynchronous lines with the same transmission rates as their synchronous counterparts, the official said.

Basic B1825

A basic 96K-byte B1825 with an operator display console costs $48,000 or leases for $1,575/mo under a one-year contract. A minimum 128K-byte B1835 with a display console sells for $69,700 or leases for $2,260/mo under a one-year contract.

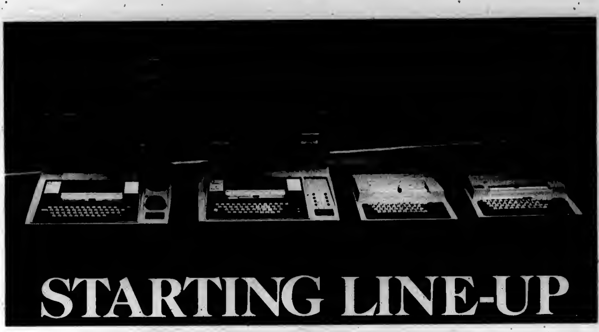
A basic 256K-byte B1865 with console, meanwhile, costs $140,090 or leases for $4,540/mo under a one-year contract.

The systems are also available under three-and five-year leases, and all prices include service, the spokesman noted.

Available Options

Options available with the B1825, B1835 and B1865 include a microprocessor-based data communications subsystem, which costs $3,000 or leases for $110/mo, and a multiline communications control system, which costs $7,000 or leases for $255/mo.

Deliveries of the B1825 begin immediately, and the first shipments of the B1835 and B1865 will start during third quarter 1978 and first quarter 1979, respectively.



TI covers all the bases when it comes to your terminal needs.

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Our terminals can be on speaking terms with your computer from floor to floor; building to building; even from field office to home office.

All four have something in common: they have virtually silent thermal printing, capable of printing at up to 30-cps; they have ASCII keyboards; they have standard EIA serial interfaces; and they are all backed by TI's reliability.

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The 733 offers the big performance of dual magnetic-tape cassettes; off-line storage; the speed, quietness and field-proven performance of *Silent 700* keyboard data terminals; and maximum system utilization with lower line charges.

The 742 offers programmability; TICOL*, a powerful data entry language; automatic search; preprogrammed error recovery; preprocessing; and the ability to capture data independently of the host computer.

The 743 offers a compact keyboard send-receive terminal with field-proven thermal printing and low prices, so you can very easily afford to become, or increase, a multiterminal operation.

And the 763 has built-in nonvolatile bubble memory so it can remember even when the power is off, while it waits to talk to your computer. It also has off-line editing, and a built-in numeric cluster.

Built into all our terminals is over 30 years of experience in the electronics industry, the technical expertise and support of our worldwide organization of factory-trained sales and service engineers, and the backing of TI-CARE†, our nationwide automated service dispatching and field service management information system.

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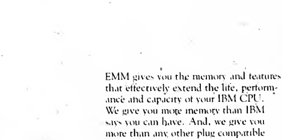

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- Deferred maintenance
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EMM add-on memories significantly expand the operating capacity of your System 370. Our add-on memories are the most reliable around. Using proven 4K chips. With features designed to keep our memory up and running when you need it. Our memories require the fewest logic upgrade cards giving you fast installation with minimal attachments to your IBM CPU. Because we build our own memories, you're assured of on-time delivery when you select EMM memory.

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- Deferred maintenance
- Field upgradable in 256/512 increments
- Multiple floor plans

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- EMM delivers 16 Megabytes of memory
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- Deferred maintenance
- Backup power supply (RASI package)
- Upgradable to 303X models
- Multiple floor plans

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- Field upgradable/convertible to Model 30 or 50
- EMM supplies upgrade materials

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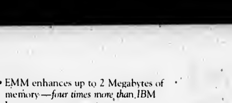

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Over the years we have developed a special five point "what to look for in an add-on memory supplier" checklist. It includes:

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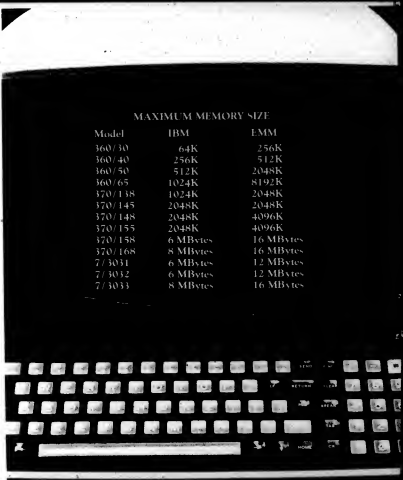
Reliability You Can Count On Our add-on memories are designed for reliable operation. We use fewer parts, less power and less CPU parts to enhance reliability. For our semiconductor memories, we use IBM technology which has proven to be the most reliable around. And, we build our own memories ensuring that you have the most reliable memory available.

Available When You Need It Even if your IBM main memory fails, your EMM memory keeps operating. Unnecessary downtime is eliminated with our deferred maintenance feature which lets you switch any troublesome 512K or 1024K memory off-line without interrupting operations. On some models, we offer standby memory, bump store backup and backup power supplies.

Superior Price/Performance Compare EMM's price/performance with IBM's and you'll see one reason why EMM is the world's largest independent add-on memory supplier. We deliver this memory in a flexible financial package tailored specifically to your capital and cash flow requirements.

We Grow With You As your memory needs grow, our add-on memories stay with you. In many cases, our memories are field expandable and convertible to other models. We can upgrade your memory using the existing installation. And, no matter what CPU you have, you'll find that EMM has the smallest access area requirement and uses less floor space than any other plug-compatible add-on memory system.

This checklist will enable you to better evaluate the factors that should and do make the difference in making your final selection. And, we are confident that when all is said and done you'll come to the same conclusion as thousands of others. That EMM is the difference in add-on memory.



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360/40	256K	512K
360/50	512K	2048K
360/65	1024K	8192K
370/138	1024K	2048K
370/145	2048K	2048K
370/148	2048K	4096K
370/155	2048K	4096K
370/158	6 MBytes	16 MBytes
370/168	8 MBytes	16 MBytes
7/3031	6 MBytes	12 MBytes
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7/3033	8 MBytes	16 MBytes

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In-House CPU Cuts Wholesaler's DP Costs 20%

PORTLAND, Maine — Data processing costs have dropped 20% at W.H. Shurtleff Co. since the wholesale distributor of industrial chemicals switched from a local service bureau to its first in-house small business system.

Shurtleff's president William Poole credits the system with eliminating most of the delays the firm previously experienced in generating sales reports, performing standard business functions and accessing critical information about customers. Since its installation in January, the system has also allowed Shurtleff, whose annual revenues total $10 million, to diversify by becoming a systems house for other chemical distributors, Poole explained.

In the five years before it converted to in-house processing Shurtleff contracted most of its DP workload to a Boston-based service bureau. But when the time-sharing firm announced a hefty increase in its $2,000/mo service charge, Poole concluded "the cost curves of bureau service and minicomputer ownership were about to intersect for us."

Realizing they could not economically justify the proposed rate hike, the Shurtleff president and his colleagues abandoned their long-time service bureau and converted instead to a Data General Corp. CS/40 small business system, which they bought from The Computer Center, a combination service bureau/turnkey systems developer based in nearby Falmouth, Maine.

Poole and his staff evaluated several other systems, he said, and soon narrowed the field of competitors to two configurations before finally opting for the DG equipment. "In our opinion, the hardware of both [our current system and its nearest rival] was comparable, but DG's software was superior," the company president explained.

For four months after its installation, the system ran parallel with the Boston service bureau. Then, in April Shurtleff cut its last tie with the time-sharing firm and began relying solely on the in-house configuration for its DP services.

Built around a CS/40 Model 5 minicomputer with 20M bytes of disk storage, the system incorporates two DG dasher CRT terminals, a Dasher 70 char./sec keyboard-send-receive printer and a Dataproducts Corp. 300 line/min printer.

Besides allowing Shurtleff to avoid an imminent hike in the Boston time-sharing firm's service charges, the system provides "a list of reports and statements such as sales analyses by customer and/or product as we need them," Poole explained. With the service bureau, by contrast, the chemical distributor could obtain much-needed reports "only at certain times, and the reports would finally reach us by mail three to seven days later," he added.

Unexpected Benefit

The system has also yielded an unexpected benefit, Poole said. In the short time since it installed the hardware, Shurtleff has developed a Chemical Management Information System (Chemis) for which the company has already received several customer inquiries and which it expects to begin marketing soon to other chemical wholesalers.

Built around CS/40 hardware and a software package written in-house, Chemis is expected to yield profits that will equal or perhaps even exceed the costs of programming Shurtleff's own system, Poole predicted.

Applications are being added to the Shurtleff system in stages. So far, the company has computerized its aged trial balances, sales analyses, receivables, payables, inventory control and order entry.

Chassis Extender Fits PDP-11 Bus

ANAHEIM, Calif. — Two sets of four-board slots or one set of nine-board slots can reportedly be added to the Digital Equipment Corp. PDP-11 series bus with a chassis expansion unit from Western Peripherals, Inc.'s Wesperline Division.

Besides accommodating PDP-11 memory and peripherals controllers, the Model 919 accepts DEC's LSI-11 boards and modules, according to Wesperline.

Snap-Off Front

Almost identical in appearance to its DEC counterpart, the chassis expansion unit comes with a snap-off front panel and an inner module that permit front access, a spokesman noted. The inner module extends like a drawer and allows users to service their printed circuit boards without removing the chassis from its rack, he added.

Measuring 5.25 in. high by 19 in. wide by 20 in. deep, the unit costs $550 excluding integral power supply. Wesperline is located at 1100 Claudina Place, Anaheim, Calif. 92805.

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When you're ready to change your system, choosing the right package can be tricky business. Up the speed and you up the cost. Lower the cost and you reduce capability. Where is the happy medium between performance and expenditure? Find out! In our July 31st supplement: *Systems and Utility Software*, edited by Brad Schultz. Featuring tutorials and applications stories as well as late-breaking news, we'll be concentrating on finding the best ways to cut the hidden costs of using and maintaining systems and utility software, especially in the area of:

- Resource allocation
- Program sequencing
- Merging/Sorting of Data
- Control of access
- Compilation

If you're an MIS executive, DP Manager, Supervisor or Programmer, you'll find our July 31st report especially valuable. If you market systems or utility products — your ad should be there. Closing date is July 14th. Or, to reserve space, call Terry Williams at (617) 965-5800.

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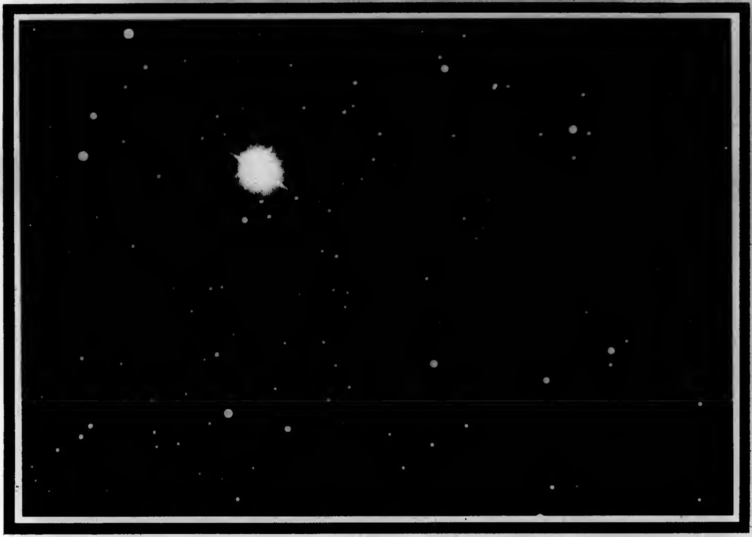

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Mini-Based System Speeds Firm's Inventory Process

(Continued from Page 47)

ventory levels for each of the firm's stock items. It also warns warehouse personnel when the supply of any houseware product part begins to run short.

Historical File

In addition, the system maintains an historical file that allows CGE officials to track the long-term usage patterns for each part in the company's warehouse, the spokesman said.

Among its other functions, Oscar generates assorted management reports including summaries of each day's transactions and weekly stock ledger files that serve as a hedge against system failure.

Under the Oscar system, CGE warehouse personnel manually write purchase orders and enter the information into the GE-115 system several times a week. For all open orders, the company then generates a magnetic tape, which it runs each evening on the HP 3000.

When the ordered parts begin arriving at the warehouse, the receiving office staff enters the purchase number of each item into the HP system's data base through an HP 2640 CRT terminal. Maintained in a 15M-byte disk system and duplicated in the GE-115 computer, CGE's data base consists of three files — a list of outstanding purchase orders, a list of parts in inventory including their warehouse locations and a master list of the parts needed to assemble each of the company's products.

Identification Tag

After warehouse personnel acknowledge the receipt of an order in the data base, a nearby GE Terminet printer produces a two-part identification tag describing the incoming item with information like engineering drawing number, the quantity received, application for the part and its prospective location in storage.

Receiving office personnel then attach one part of the tag to the arriving material and return the other part to the stores clerk with an indication of the part's warehouse location. The stores clerk in turn enters the location into the 3000 system, which revises the inventory count for that part accordingly, a CGE official explained.

When materials managers later need a quantity of the item for the assembly line, a storesman uses the on-line terminal to inquire about the part's availability. If the desired item is still in stock, CGE personnel manually write a line requisition form and tell the computer to produce a pick tag showing the part's identificaiton number, description, warehouse location and the quantity requested.

After being generated on a receive-only Terminet printer, the pick tag is used by a truck-lift driver to find and retrieve the requested item.

Floppy Disk Controller Bows

SANTA CLARA, Calif. — A floppy disk system controller from Cybernetic Micro Systems, Inc. (CMS) operates either as a stand-alone unit or with a host processor.

Using only a dumb terminal or teletypewriter, the Model IFC-8400 reportedly creates, deletes and edits files while operating off-line from a central computer. The Intelligent unit also interfaces to any microprocessor- or minicomputer-based system through an RS-232 or 20 mA current loop serial channel, CMS spokesmen said.

Optional parallel, 8-bit TTL I/O channels are also available with the controller, they added.

The Model IFC-8400 is said to control up to eight SA400 or SA800 single-sided, single-density floppy disk units from Shugart Associates.

CMS officials partly attributed the controller's stand-alone capabilities to a diskette operating system stored in an on-board read-only memory (ROM). The operating system in turn controls the 8400's built-in microprocessor.

In its basic form, the operating system provides all the code required to execute board functions. With the addition of custom-coded programmable ROM, however, users can extend the software to gain performance features that otherwise would not be available.

The Model IFC-8400 costs $795 from CMS at 2378A Walsh Ave., Santa Clara, Calif. 95050.

Finally, the macro maker of computer printers has gone micro. With a high-speed, desk-top, non-impact printer complete with parallel interface (Model P1) that's perfect for the home, hobby and small business user. A complete 80-column printer for less than ~~$500~~.

The new Centronics microprinter is big on performance. It prints clean, clear dot matrix characters at a rate of 150 lines per minute. Yet it's quiet, compact, comes fully warranted and is backed by Centronics' worldwide service. It's even available in a serial interface version (Model S1) for remote applications.

Of course, buying your small systems printer from the industry's leading producer of printers is simply a better buy. You get the security, support and systems flexibility only Centronics can bring. Plus the targeted technology that brings out the best in any computer.

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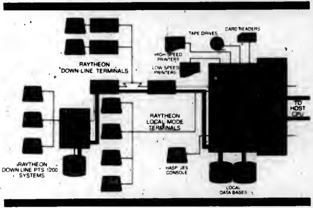
The Raytheon Checklist. A distributed processing user's best friend.

The term distributed processing is new enough that many people, both users and manufacturers, mean many different things when they talk about it.

Rather than try to add another definition to the many now existing, Raytheon Data Systems has prepared this comparative checklist of the major functions that might normally be considered attributes of any distributed processing system. Regardless of the distributed processing system you eventually select, there are a number of capabilities you will want that system to possess. Obviously, the more features the system has, the greater its capacity to do all the work you have planned now—or might need tomorrow.



Shown above is a typical schematic of a PTS/1200 distributed processing system with a hierarchy of local data bases, multiple terminals in multiple applications, all linked by one or more protocols to a central mainframe

Our checklist itemizes many of the most important features you should consider. They are not the only features, but we think they are the most important.

And—to make the point that Raytheon's PTS/1200 MARK-I and MARK-II systems are extraordinarily powerful distributed processing systems—we've taken the liberty of itemizing their capabilities in each of the columns shown. Do that with other vendors' equipment, and we think you'll choose Raytheon.

Then check prices. The MARK-I is lowest.

After you've looked at the variety of products on the market, you'll also want to see what each costs.

We can tell you about Raytheon's pricing. The PTS/1200 MARK-I is the lowest. By low, we mean up to 30 per cent below the most popular alternative models. The PTS/1200 MARK-II costs a little more, but is more than twice as powerful as the MARK-I. You won't be able to compare its cost directly with other equipment, because no other equipment can come close to matching its performance.

Solving the installation and productivity problems that these users encounter takes patience, skill and the commitment of an experienced vendor. It takes going beyond a standard product, and finding customized solutions, and often products, to meet a user's requirement.

Most of all, it takes doing it. Over and over and over again. Raytheon has done it over and over and over again.

Fast, easy installation and growth is vital.

Not shown in the checklist is another vital aspect of distributed processing systems—immediacy of installation and ease of expansion. The Raytheon PTS/1200 MARK-I can be installed in less than a day, with no change to host hardware, or systems or applications software. You become productive right away. And when you want to grow, you simply add capacity—within a single system, or by adding additional systems or devices. Every PTS/1200 is compatible with every other—and with your host mainframe system and protocols in almost every case.

Look hard at experience too.

Beyond the hardware, the price and the easy compatibility, there is the experience factor. The vendor with experience can save the user without it a lot of grief.

Raytheon is the world's largest non-mainframe supplier of intelligent terminals and distributed processing systems. Some of our customers use more than 2,000 Raytheon terminals in data networks located at more than 300 locations either domestically or around the world. Many others have one or several PTS/1200 distributed processing systems at work in remote locations, linked on-line to a central mainframe.

A typical four-station MARK-I system with a 64K-byte controller, 10 MB disk, and one 165cps printer leases for $850 per month, including all software and maintenance

The 54-Point Checklist

Feature	Typical Configuration	Importance of Feature	Product Capabilities			
			PTS/1200	Brand X	Brand Y	Brand Z
INTELLIGENCE	✓ Dependent totally on host processor ✓ Stand alone (non shareable) intelligence in each station ✓ Small-cluster (shared by 1-8 stations) ✓ Large cluster (shared by 1-24 or more stations)	Intelligence is based upon the amount of available programmable memory a system possesses. Its purpose is to facilitate local application development and execution. The larger the available memory, the better the applications freedom	N/A All resources shareable by all stations 64K to 128K bytes 64K to 128K bytes			
CONTROLLER	✓ Word size ✓ Number of operator stations per controller ✓ Number of peripheral attachments per controller ✓ Availability of high level languages ✓ Ability to perform multi-tasking	The controller is the central processor of a distributed system. Its power in terms of word size, attachment capacities, programmability and ability to perform multiple tasks concurrently is the key limiting factor in its ultimate performance	16-bit 1-8 stations or 1-24 stations 1-4 peripherals, or 1-20 peripherals Yes MACROL COBOL in the future Yes Up to 32 tasks concurrently on one controller			
TERMINALS	✓ Variety of screen sizes ✓ Variety of keyboard options ✓ Availability of user definable function keys ✓ Ability to provide operator prompting ✓ Ability to attach remote terminals on phone line	The terminal is the point of operator interface and should be capable of being comfortable to use, easy to use, and easily matched to one or many different applications through customizing	760 or 1920 3270 type writer data entry [illegible] program, function keys plus any key programmable Yes, by screen, audio and light indicators Yes			
PERIPHERAL ATTACHMENTS	✓ Number of attachments per controller ✓ Low speed printer devices ✓ High-speed printer devices ✓ Card reading devices ✓ Magnetic tape transports ✓ Printer, word processing quality	The ability to attach a variety of peripheral equipment of various speeds and capacities is a measure of the range of work a system can do	1-4, or 1-20, any combination 4[illegible]-165 CPS 3 models 300 LPM and 600 LPM [illegible] 800 and 1600 BPI Yes			
COMMUNICATIONS PROTOCOLS	✓ Asynchronous ✓ Synchronous ✓ Binary Synchronous —Batch —Interactive ✓ Synchronous Data Link Control (SDLC)	The ability to support more than one protocol—at the same time on the same system—adds immeasurably to the number of tasks and number of networks a system can work in without additional user development effort	Yes, TTY RS-232 Yes Yes Yes			
INTELLIGENT 3270 OPERATIONS	✓ Local format storage ✓ [illegible] ✓ Ability to access and update local data bases ✓ [illegible] ✓ Field verification at each terminal location ✓ Application program decides when to go to host	This feature assures that the system can work immediately and easily with the most popular terminal devices in use today and extend the performance of those devices in a variety of ways	Yes Yes Yes Yes			
EMULATION CAPABILITIES	✓ 3270 interactive (dumb) ✓ [illegible] ✓ 2780 batch ✓ 3780 batch ✓ SDLC batch/interactive ✓ HASP [illegible] entry ✓ Non-IBM protocols ✓ [illegible]	Emulators are software tools that permit a system to operate as a look-alike under other vendors protocols and procedures. Their advantage is to permit direct and immediate attachment to networks using a specific device protocol	Yes Yes Yes Yes Yes in 1979 Yes Yes Yes			
DATA BASE STORAGE	✓ Multiple disk storage capacities ✓ Memory management software ✓ Ability to expand to very large local storage	Local data base storage under sound memory management techniques assures powerful local filing, easy off-loading of large central files and elimination of unnecessary communications to and from host	Yes, from 10 to 320MB Yes Yes, to 320 MB per system			
SOFTWARE LANGUAGE	✓ Assembly language ✓ Strong macro command repertoire ✓ [illegible] ✓ Easy-to-learn and use ✓ [illegible] programming aid ✓ Parameter-driven aids where required	Language is the facility that makes it possible to tap the power of the basic system by allowing applications to be written easily. Simple but rich high-level language that can be learned easily by programmers or used by non-programmers extend a system's reach that much further	[illegible] personnel Yes, 150 instructions [illegible] Yes Yes Yes, for format creation and source data entry			
NETWORK ENHANCEMENTS	✓ Concurrent communications operations ✓ Downline control of multipoint networks ✓ Remote program development support for maintenance [illegible] language ✓ Teleprinter network on terminal lines ✓ Downline program debugging ✓ Downline terminal loading ✓ High speed data transmission rates		Yes, batch and interactive at same time Yes, up to 10 drops per controller Yes Yes on same lines at same time Yes Yes To 9600 BPS			

Raytheon—50,000+ terminals in use now.

When you select Raytheon, you are selecting a total single-source supplier who has installed more than 50,000 intelligent terminals. A supplier with a worldwide field maintenance organization that is linked together by its own distributed processing network that keeps track of every equipment outage for every customer. A supplier that does not need to offer third-party leasing, because it maintains its own self-financed leasing company. And a supplier whose customer list includes a very high percentage of the world's largest industrial, commercial, financial, insurance and government data systems users.

Raytheon. The company to pick when you've completed your distributed processing checklist.

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☐ MARK-I
☐ MARK-II

Tell me more about some of the features shown on The Checklist. I'm especially interested in:

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Micro Chips

Interface Bus Fits 8080s, Z80s

NATICK, Mass. — Control Logic, Inc. has announced a general-purpose interface bus for 8080 and Z80-based microcomputers that is said to meet IEEE-488 requirements.

The MEE-888 bus works with microcomputers that have up to 64K of memory in any combination of random-access memory (1K and 4K boards) and electrically programmable read-only memory (2K, 2708 or 8K, 2716).

The function of "talker," "listener" and "controller" can be performed using the interface and the appropriate controlling software, the firm claimed.

The bus interface costs $495 from the firm at 9 Tech Circle, Natick, Mass. 01760.

Prom Board Unveiled

SAN DIEGO, Calif. — Electronic Solutions, Inc. has a 32K programmable read-only memory (Prom) board compatible with Intel Corp.'s SBC 80 Multibus.

The Prom-32 accepts as many as 16 2716-type erasable programmable read-only memories (Eprom) and has a maximum memory access time of approximately 475 nsec, the firm claimed. All of the integrated circuits on the board, including the Proms, are socketed and the jumper-selectable base addresses fall on 16K boundaries.

Any number of 2K memory address blocks can also be deselected by jumper removal.

The board uses 5V at .38A and is priced at $195 in unit quantities from the company at 7969 Engineer Road, San Diego, Calif. 92111.

TRS-80 Gets Interface

CHARLESTON, S.C. — Computerco, Inc. has unveiled an S-100 bus interface that is compatible with Radio Shack's TRS-80 microcomputer system.

The interface costs $250 and informational packages are available for $10 from the company at 5833 Dorchester Road, Charleston, S.C. 29405.

Professor Observes:

Personal DP's Path Uncertain

By Tim Scannell
CW Staff

ANAHEIM, Calif. — Microcomputer vendors and suppliers have geared their operations to accommodate the forthcoming "boom" in personal computing that has been predicted by industry observers, but no one is in fact "quite sure just what will occur," according to Jack Nilles, a professor at the University of Southern California.

Manufacturers should both identify and monitor three areas in order to get a complete picture of the future trends in the microcomputing industry, Nilles said here recently at the Personal Computing Festival. Those areas include the direction of technological growth, the impact this technology will have on the individual and the status of related public policy issues.

Many "experts," Nilles continued, do not know exactly what a personal computer is and therefore are unable to provide an accurate portrait of the machine's future. The first thing to be understood is that the microcomputer is a general-purpose, stand-alone computer containing one or two microprocessors and not "a lawn sprinkling system or automatically controlled oven," he stressed.

The microcomputer should be affordable by either an individual or group of individuals, it should be able to be operated by nonprofessional computer enthusiasts and it should also be applicable to a variety of uses, Nilles stated. These uses are generally in hobby, business, education and entertainment applications.

Vendors should also strive to identify both the "actors" and the "stakeholders" within the personal computing industry, Nilles said. The actors are the most important group because they are the users or the people "who do things with personal computers" while the stakeholders stand off to the side, watching the actors.

Government Regulation

Proposed government regulations also bear watching, Nilles noted. Although there are no explicit laws on the books right now and lawmakers are seemingly "ignoring" the growth of personal computing and its related machinery, it is inevitable that rules will eventually be mandated.

Hobbyists have already started to communicate with other hobbyists' computers via amateur and citizen's band radio, Nilles said. This type of operation could be classified as a form of telecommunications and therefore subject to related laws.

In the area of privacy, personal data bases or "lists of anything about people," could be subject to regulation under future laws, Nilles pointed out.

There are, however, numerous opportunities that have evolved because of the growth and continued use of the microcomputer. Computers have raised educational standards and allowed teachers to use "cheap computers to teach basic fundamentals to children in the classroom," Nilles noted. Computers have also increased employment in the industry, especially for the handicapped, and provided a new avenue for interpersonal communication, Nilles said, as in the development of communications via electronic mail systems.

Book Describes Cycles In Micro Logic Design

By Tim Scannell
CW Staff

BERKELEY, Calif. — Logic within a microcomputing system is broken up into two separate areas: the digital logic design cycle, or those actions which occur inside the microcomputer itself; and the microcomputer programming logic design cycle, consisting of those steps constructed outside of the system.

These two areas are discussed in detail in *Z80 Programming for Logic Design*, a book by Adam Osborne, Jerry Kane, Russell Rector and Susanna Jacobson. The paperback is intended for programmers, logic designers and hobbyists who have at least a basic knowledge of microcomputing theory, according to the publisher, Osborne & Associates, Inc.

Using the premise of the existence of two specific levels of logic, the authors attempt to explain the functions of a microcomputer system from "the sequence of instructions which, taken together, constitute an assembly language program" to what these individual instructions do within the microprocessor.

Cautioning the reader that "the specter of programming will haunt you only if you let it," the authors begin by defining just what is meant by the separation of logic within the basic microcomputer system.

First of all, the reader must strive to "develop some criterion for estimating what a microcomputer system can do and what it cannot do, based on the ability of assembly language to simulate digital logic." Then, the text continues, the reader should "create a program to implement the logic functions which have been assigned to the microcomputer" and, having mastered the concept of using instructions, "learn how to write efficient programs."

In its first three chapters, the book describes what takes place when instructions are given to the microcomputer. Event sequences and timing, determining data sources, I/O functions, time-outs and interrupts are discussed as well as programmable timers, flip-flops, memory utilization and real-time simulations.

'From Programmer's Viewpoint'

In the following chapters, programming and device configuration are covered from a "programmer's point of view." This particular section focuses on the specific differences between assembly language instructions and digital logic.

"The principle difference be-

(Continued on Page 64)

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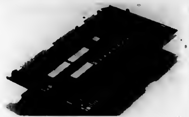
National Semi Adds Three Single-Board Micros

SANTA CLARA, Calif. — Three single-board microcomputers from National Semiconductor Corp. reportedly contain integral read/write and read-only memory (ROM) as well as 1K, 2K or 4K of static random-access memory (RAM).

The BLC 80/11, 80/12 and 80/14 each include a central processor, system clock, RAM and ROM, I/O lines, serial communications interface, bus logic and drivers, according to a spokesman. The boards incorporate the firm's INS8080A microprocessor, which provides six general-purpose 8-bit registers, an accumulator, a 16-bit program counter and a 16-bit stack-point register.



BLC Series 80 Board

The microprocessor's registers can be utilized singly or in pairs and the 16-bit program counter allows direct addressing of a full 64K bytes of memory, the firm added.

The stack pointer controls addressing of an external stack located within the read/write memory, the spokesman continued. The stack may be used to store the contents of the various registers while servicing interrupts and subroutines.

Parallel and serial I/O are fully programmable on the boards under MPU control and 10 available sockets allow users to install terminators or drivers to configure 48 parallel lines to their specific I/O configuration.

The serial port is programmable either for 20mA current loop or RS-232 interface with data rates from 110 bit/sec to 38,000 bit/sec. RS-232 signals are jumper-selectable to board edge I/O connectors, the firm said.

The BLC 80/11, 80/12 and 80/14 are priced at $470, $485 and $570 each from National Semiconductor Corp., 2900 Semiconductor Drive, Santa Clara, Calif. 95051.

Book Covers Logic Design

(Continued from Page 63)

tween digital logic and assembly language," according to the book, "is that assembly language treats events chronologically, while digital logic segregates logic into functional nodes. Thus, one logic device may be responsible for a number of events occurring at different times during any logic cycle; when translated into an assembly language program, each event becomes an isolated instruction sequence."

Another difference between digital logic and aasembly language is the concept of timing, the book notes. "Within an assembly language program, timing results strictly from the sequence in which the instructions are executed," while digital logic timing is restricted to "clock signals and the need for clean signal interactions." The fact that users are unable to exactly duplicate digital logic using assembly langauge instrutions doesn't mean that assembly langugé is in any way inferior but "that assembly language is [simply] going to do the job in a different way," according to the authors.

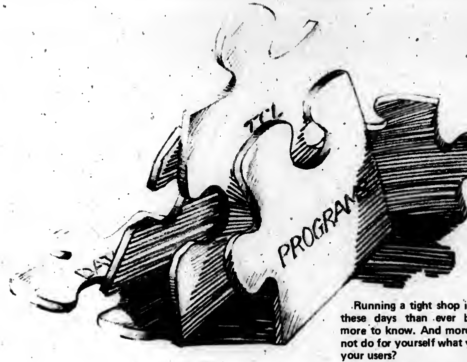
The fifth chapter deals with the programmer's perspective and efficiency in program construction. "One of the most confusing things about programing," the book continues, "is the trivial ease with which you can do the same thing in 10 different ways . . . To a great extent, writing efficient programs is a talent, just as creating efficient digital logic is a talent; but there are certain rules which, if followed, will at least help you avoid obvious mistakes."

These rules, according to the book, include having a thorough knowledge of multiple and conditional subroutines, macros and macro parameters, interrupts and interrupt hardware considerations.

Finally, the book reviews some commonly used subroutines that cover indirect and post-indexed memory addressing, data block movement, binary and decimal arithmetic and 8- and 16-bit binary multiplication and division.

Z80 Programming for Logic Design is priced at $7.50 from Osborne & Associates, Inc., P.O. Box 2036, Berkeley, Calif. 94702.

Get It All Together...



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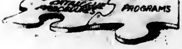

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Independents Eye Early Base

Series 30 Memory Seen Bonanza Market

By Marcia Blumenthal
CW Staff

ANAHEIM, Calif.— Add-on memory makers agree that IBM's apparent shortage of memory for its Series 30 processors is creating a bonanza that will help the independents establish a customer base early in the products' life cycle.

The shortage is expected to last 12 to 18 months as IBM gears up hardware production to meet the higher than expected demand for the systems, they added.

Furthermore, an informal survey of 30 series add-on memory makers during the recent National Computer Conference here revealed some independents are considering raising prices for memory for the series because the near-term demand far outstrips the supply.

David P. Goldsmith, director of marketing development for National Semiconductor Corp., said IBM is totally production-limited. The decision IBM has to make is not how much memory to produce, but how many of each of the three CPUs in the series to build, Goldsmith said.

National Semi will now sell its memory directly to the end user, according to Goldsmith, who added the add-on memory market has always been good as long as the price is lower than IBM's.

STC to Enter Arena

Although Storage Technology Corp. (STC) has held off formally announcing its Series 30 add-on memory product, Don Vermeer, memory product manager, told *Computerworld* STC will definitely enter the market.

The delayed announcement is a result of National Semi's decision to market directly to the end user, Vermeer said. Until now, STC has purchased its memory from National Semi.

STC is currently looking for another source for its Series 30 memory, he pointed out, and the company expects to make a decision on a supplier within a month. It will continue to buy memory for the 370/158 and 370/168 from National Semi, however, Vermeer reported.

Vermeer agreed with National Semi's Goldsmith that IBM is production-limited on memory. "The usual configuration on the 3031 and 3032 models is 6M bytes of memory, with 8M bytes for the 3033," he explained, "but users who order systems with 6M bytes will probably only be able to get three from IBM." In fact, Vermeer said, in the near future customers will demand 3033s with 16M bytes.

"IBM is happy to have the independents around," quipped Kent Mueller, Intel Corp.'s director of field operations. Users are not waiting for IBM to gear up its memory production.

"Usually when a new product is announced, independents are not successful selling in the market during the introductory stage. In this instance, there is demand for the product from the independents in the initial stage," Mueller said.

He added that Series 30 memory will be in short supply for the next 12 to 18 months, allowing independents to sell all they can make.

Another problem causing the memory shortage, according to Paul J. Shapiro, man-

(Continued on Page 70)

Lack of NCC '79 Space Incites Boycott Threat From Exhibitors

By E. Drake Lundell Jr.
CW Staff

ANAHEIM, Calif. — Some exhibitors at the recent National Computer Conference here were up in arms about the arrangements for next year's show, and there was even talk of boycotting the 1979 conference in New York City.

But in many ways there is little the show organizer, the American Federation of Information Processing Societies (Afips), can do to head off the potential revolt.

The basic cause for complaint on the part of exhibitors — lead by Data General Corp. — is the lack of room for all who want to exhibit at the next NCC. While the New York Coliseum will probably house as many booth spaces as this year's show, many exhibitors are taking spaces larger than the ones they had this year, squeezing less favored companies.

All the space for the 1979 edition of NCC is already sold out, and there will be even less room for those exhibitors who have not been at an NCC before — in fact, these people may be totally closed out.

The situation has arisen from several factors. First, Afips has assigned a priority system for exhibitors; those who have supported the show for a long time receive priority treatment when booking booth space for the next show. Those who have taken larger booth spaces in the past also get extra credit.

This marks a reversion to the older system sponsored by Afips. For this year's show here, the organizaiton sponsored a "land rush" system for booth space in which exhibitors waited in line — some all night — to sign up for the prime spaces. However, exhibitors complained about this method of selling and assigning booth space, so the organizers went back to the older priority system.

Analysis

However, with times good, more exhibitors want to be in the show and they want to book larger booths. Therefore some exhibitors — such as DG and Digital Equipment Corp. — received less than what can be called "good" booth space for the 1979 show.

Many of these firms — which will be stuck on the fourth floor of the New York Coliseum, the worst space in an overall rather shabby convention site — are upset and are indicating they may pull out of the show.

Such a pullout is probably unlikely, since show organizers may be able to rejuggle the schedule and get better exhibit space for some of the firms.

The situation is difficult and there will be no easy answers, although two shows a year — such as the previous Spring and Fall Joint Computer Conferences — have been suggested as a way to keep down the number of exhibitors at any one conference.

At 1,500 booths, the National Computer Conferences is clearly too big for most facilities in the U.S. Only Chicago's McCormick Place really has the room to house the show, and that site is sold out until sometime in the next century, with Afips booking it only in 1981 and 1991.

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Witness Stresses Risks

IBMer: Firm Put Itself on the Line With 360

By Catherine Arnst
CW Staff

NEW YORK — IBM "bet the company" on its System 360 line in the early 1960s and the payoff was the growth of both IBM and the computer market, Richard Case, director of IBM's Advanced Systems Development Group, testified recently at the U.S. vs. IBM antitrust trial here.

As IBM's second witness in its direct case at this trial, Case echoed the same theme that ran through the firm's pretrial brief and all the other antitrust cases for which it has mounted a defense — that is, IBM's extraordinary success in the DP industry is a result of the extraordinary risks it took to achieve that success.

Case spent 11 days on direct examination laying the groundwork for the testimony of the 95 defense witnesses scheduled to come after him. He concentrated on the risks IBM took with its 360 line of computers, which were designed with the goal of "growing that market." In other words, IBM wanted to push demand into new areas which were yet unexplored, he said.

Goals for 360

IBM's specific goals for the 360 line, according to Case, were to build a new circuitry, develop a "long-life architecture" with the broadest possible range built into its instruction set, have compatibility and modularity throughout the line, design a new operating system, offer a full line of peripheral devices, insure a great degree of reliability and serviceability and make educational resources available.

IBM achieved all these goals and also succeeded in "growing" the market, Case said. IBM's pretrial brief concurred, stating that "had IBM not introduced the System 360, the DP industry would be a much different universe, to the detriment of users of DP equipment throughout the world."

The government has charged that the 360 line was developed to ensure that IBM had the dominant position in the computer industry by locking users into IBM systems. The Justice Department has maintained IBM used the 360 systems as "fighting machines . . . introduced ahead of schedule, usually with low profit expectations, in those markets where IBM's monopoly position had eroded or threatened to erode."

The first six models of the 360 line were announced in 1964, but IBM had been planning the system since 1961, when it organized a task force of top executives, designated the Spread Committee, to develop IBM's product strategy. Out of that committee came a determination to develop a line of products which were interchangeable, allowing users to upgrade their systems without having to scrap all their previous components.

Combination of Capabilities

The committee also wanted IBM to design a system which was capable of handling both general-purpose commercial applications and scientific applications, Case said. Prior to the 360 announcement, a system was considered to be either scientific or general-purpose and lacked the capabilities needed to do the other applications, he said.

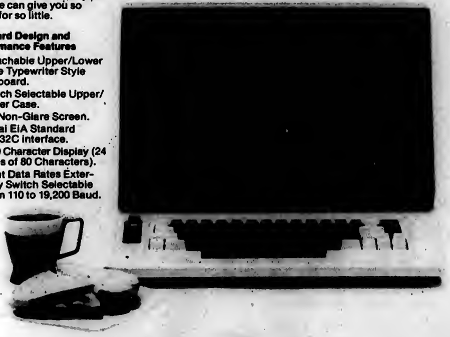
Case defined a scientific system prior to 1964 as one containing binary capabilities, a fixed word length, low dependence on an alphabet, lower input/output rate than a business computer, floating-point arithmetic and a binary address system for the main memory.

A business computer operated with the decimal system, had a variable word length, relied on the alphabet, had a high input/output rate, offered character string processing and had a decimal address system for the main memory, he said.

When the 360 line was announced, IBM provided users with a family of computers that had both binary and decimal arithmetic functions, fixed and variable word lengths, a good alphabet capability, high input/output rate, binary main memory addressing, floating-point arithmetic and character string processing. Consequently, the 360 systems were capable of doing both scientific and business applications, which eliminated to a certain extent a distinct market for scientific as opposed to general-purpose computer systems, Case said.

This portion of Case's testimony went directly to the heart of the government's case against IBM. The government has charged IBM with monopolizing the general-purpose business computer system market, which is a distinct and well-defined market that does not include scientific computers. The government must prove there is a sharply defined market before it can prove IBM exercised monopoly power over that market.

There was considerable risk in combining scientific and business computer capabilities and there was disagreement within IBM as to the potential results, Case said. Several members of the development team opposed combining those functions because "it was said . . . someone could make competitive hay by saying, 'Here's a scientific machine not burdened down by commercial applications features,' " Case said.



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Supershorts

Siemens Corp. and Three Phoenix Co. have entered into an agreement covering the manufacture and distribution of hard disk memory testers. Three Phoenix will manufacture testers for Siemens, and Siemens will serve as the distributor for the testers in the U.S. and certain overseas countries.

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Hewlett-Packard Co. delivered its 25,000th CRT terminal recently. The milestone terminal, an HP 2645A, was purchased by the Canadian government's Department of Supply and Services to access data bases maintained on HP 3000 CPUs.

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Electronic Memories and Magnetics Corp. has formed a subsidiary, Severe Environment Systems Co., which will be headed by Richard P. Shively. The company designs, develops and manufactures memories and systems for use in harsh environments.

— — —

Dometic, Inc., a subsidiary of AB Electrolux of Sweden, gained 36% ownership of Dataroyal, Inc. through a stock purchase with the option of acquiring up to a 50% interest. Facit AB, another division of Electrolux, will market Dataroyal's IPS 7000 matrix printer in Europe.

— — —

Prime Computer, Inc. has opened a research and development operation in Bedford, England, which will develop specific software products.

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Data 100 Corp. has signed an exclusive distribution agreement with the Ransom Company, C.V., to market and maintain Data 100 multifunctional terminal systems in Mexico. This marks Data 100's entry into the Latin American market.

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Data Electronics, Inc. of Pasadena, Calif., has appointed Facit AB Data Products of Stockholm, Sweden, as its exclusive Western European representative for Data Electronics' 1/4-in. Ansi digital cartridge tape drives and related products.

— — —

The British government has granted the Queen's Award to the computer peripherals manufacturing plant of Control Data, Ltd. in Brynmawr, South Wales, for increases in export earnings. During 1977, earnings amounted to $9.1 million, compared with $1.6 million in 1975.

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Perkin-Elmer Corp.'s Terminals Division has signed a contract with Prime Computer, Inc. for delivery of 1,000 CRT terminals for use with Prime's product line.

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Sycor, Inc. has extended its distribution agreements with CMC France S.A. and Computer Machinery (Deutschland) GmbH to include Sycor's 400 series of distributed data entry and processing systems.

The board of directors of the Computer & Communications Industry Association has elected Philip S. Nyborg the association's vice-president and general counsel. Nyborg has spent the last three years as director of the Washington office of the American Federation of Information Processing Societies.

Hewlett-Packard Co. has added the company's desktop computer manufacturing division in Fort Collins, Colo., to the company's Computer Systems Group.

— — —

Microdata Corp. has concluded a transaction to acquire the remaining 25% interest in Computer Machinery Company Ltd. (CMC/UK) of Hemel Hempstead near London.

— — —

Cullinane Corp. began marketing and technical support operations in Mexico and Central America. Alejandro Ramos is the general manager of the new affiliate, Cullinane Mexicana S.A. de D.V.

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Dataproducts Corp. has established a facility in Ponce, Puerto Rico, that will manufacture its M-200 dot matrix and T-80 thermal matrix printers.

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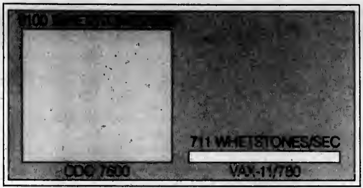
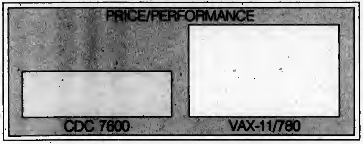
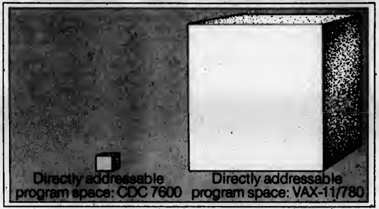


Round two to VAX: Price/Performance. The 32 bit VAX is the world's fastest mini. A $141,000 VAX system runs 711 double precision Whetstones. That's one twelfth the speed—at one twenty-fifth the cost. A dozen VAX systems could equal the throughput of one 7600—and you'd still save literally millions of dollars.





Round three to VAX: Program size. Virtual addressing and a gigantic 32 bit address size, compared to the 18 bit address size of the CDC 7600, allows VAX a directly addressable program size that is—are you ready?—1000 times larger than the CDC 7600.

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Believed to Be Model 138

IBM Confirms Sale of 370 System to China

By Marcia Blumenthal
CW Staff

ARMONK, N.Y. — IBM recently confirmed that its subsidiary IBM World Trade Americas/Far East Corp. sold a medium-scale 370 system to China National Technical Import Corp., a government agency that handles purchases from sources outside of China.

Rumored to be a Model 138, the system reportedly will be installed at an air compressor factory in Shenyang, in northeast China. However, IBM would neither confirm or deny the model or the purchase price of the computer.

"It is the company's usual practice to keep the details of business transactions confidential unless the customer authorizes the release of sales information," an IBM spokesman said.

The spokesman would not comment on how long IBM expects to wait for approval from the U.S. government or whether the firm anticipates any problems in gaining approval.

IBM Chairman Frank T. Cary visited China within the past year. When asked whether trade arrangements resulted from that trip, the spokesman said the purpose of Cary's visit was to "learn more about the People's Republic of China, its industrial development, its DP requirements and the opportunity to trade there."

No specific business proposals were discussed during the visit, he added.

Another rumor that has been circulating for the past five months is that IBM sold two IBM 3032 processors to the Bank of China for use by its branches in Hong Kong. The spokesman admitted there have been business discussions with the Bank of China, but said the nature of these discussions was confidential.

He would neither confirm nor deny whether sales to the Bank of China have been finalized.

China is said to be in the market for the best DP equipment that non-Soviet nations are willing to sell in order to improve its science and industry.

A U.S. Department of Defense official said, "We aren't opposed to selling the Chinese computers unless they have a military utility. We have balked at exporting to them anything that could have a military application that they don't already possess."

Independents See Bonanza In IBM Memory Shortage

(Continued from Page 65)

ager of product planning semiconductor memories at Memorex Corp., is IBM's recent reevaluation of its memory technology. Shapiro explained IBM was experimenting moving from static to dynamic random-access memories (RAM).

IBM finally realized, Shapiro said, that density — rather than static or dynamic RAM — is the crucial technological difference.

Memorex is using the highest density RAM — 8K — of any independent memory supplier, other than Itel Corp., Shapiro claimed. He believes this will give Memorex an edge in the market for about one and a half years. Memorex, like STC, purchases rather than manufactures its memory products.

Electronic Memories and Magnetics Corp.'s (EMM) introduction of Series 30-compatible memory marked "the fastest EMM has been able to come out with a new memory product. Usually we cannot ship add-on memory for a new IBM product until eight months after IBM's first delivery," according to Anthony F. Coppola, marketing director for EMM's Computer Products Division.

Summing up the shortage of Series 30 memory, T. Kendall Hunt, vice-president of marketing for Itel Corp.'s Computer Products Division, contended it was typical of IBM to announce a product and not be able to deliver it.

Billion-Dollar Market

The market for Series 30 memory may approach more than $5 billion over the next five ears, Intel's Mueller predicted. Most of the independents agreed IBM would sell or rent about 12,000 30s over the next five years. IBM's price for 1M byte of memory is $110,000, with no quantity discounts, the independents said.

Mueller estimated the independents could capture at least a billion dollars of that market. Right now, independent memory suppliers share an annual market of $100 million, the executives said.

All of the suppliers expect to ship Series 30 memory by the fourth quarter.

Although there was general agreement on the shortage of Series 30 memory, the independent memory marketers, for the most part, did not agree on pricing strategy or the share of ihe market each one would capture.

Hunt said that Itel's price per 1M byte is $80,000, and he reported the company does not anticipate raising the price.

Presently Intel's price is $70,000 for the first 1M byte and $60,000 for each additional 1M byte, Mueller reported. However, he indicated Intel may raise prices because of limited supply and high demand.

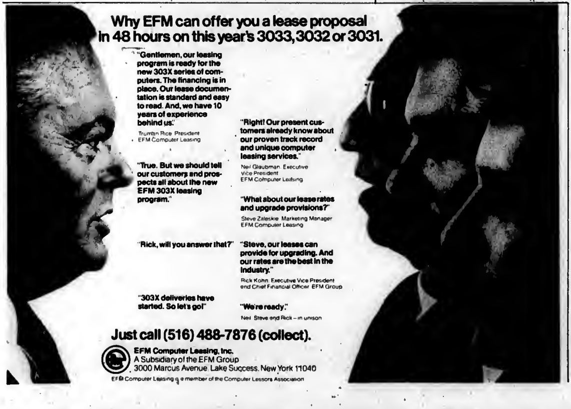
Intel hopes to grab 30% to 40% of the add-on Series 30 market, and Mueller pointed to the company's manufacturing capability and service as important marketing considerations.

Memorex is pricing its memory at $74,000 per 1M byte, Shapiro said. He didn't know whether the company planned a price increase.

Shapiro said the 3031 corresponds roughly to IBM's 370/135 to 370/148 models and claimed that because Memorex ships more memory than all the other independents combined for those models, it would be reasonable to assume Memorex will dominate the 3031 sector.

STC's price per 1M byte will be high — between $80,000 and $90,000 — to capitalize on the shortage, but Vermeer predicted that once the shortage is over — about a year from now — the price will drop to $50,000 to $70,000 per 1M byte.

Goldsmith said that National Semi would be delighted to scoop 35% to 40% of the markets.



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Pertec Earnings for Year Outpace '77 Level by 54%

LOS ANGELES — Pertec Computer Corp. earnings for fiscal 1978 sprinted ahead of 1977 earnings by 54%. Pertec earned $7.1 million or $1.17 per share in fiscal 1978 compared with $4.6 million or 78 cents per share last year.

Revenues totaled $131.8 million during the year, a 31% increase over 1977 revenues of $100.6 million.

Financial News

For the fourth quarter ended March 31, Pertec earnings were $2.2 million or 36 cents per share compared with final quarter results last year of $1.5 million or 25 cents per share.

Fiscal 1977 results were restated during the year to reflect the acquisition of Mits, Inc. in a pooling-of-interest transaction and to apply provisions of the Financial Accounting Standards Board concerning lease accounting.

Ryal R. Poppa, Pertec chairman, president and chief executive officer, noted that approximately 80% of the firm's revenues are from the outright sale of data entry and distributed DP (DDP) systems and small business systems. The balance is from leasing and servicing activities.

Customer acceptance of the XL40 DDP system continued to grow, Poppa said. He also pointed out that the sale of small business systems through 50 Mits/Altair retail outlets recorded good progress and that Pertec plans to add 25 stores by the end of 1978.

New products that increase the density of tape systems as well as additions to the flexible disk drive family for both minis and micros were announced during the year, the firm said.

Poppa noted that while the outlook is favorable for fiscal 1979, a number of overseas markets are still flat, having not yet fully recovered from the recession three years ago.

Pertec plans to file a registration statement with the Securities and Exchange Commission to underwrite a sale of 1.25 million shares of authorized but unissued common stock. Poppa said the proceeds of the sale will be used for general business purposes and to retire bank debt.

. . . But Poppa Sees Flat Half Ushering in '79

LOS ANGELES — Pertec Computer Corp. anticipates earnings levels for the first half of fiscal 1979 to be "flat to slightly down when compared with a like period of a year earlier. However, an upturn is expected in the last half of the year," according to Chairman Ryal Poppa.

"Continued development efforts and expenditures associated with positioning the company to capitalize on the rapidly expanding small business systems market are the primary reasons for a potentially flat earnings performance the first half of the fiscal year," Poppa claimed.

"There is also some profit deterioration anticipated as Pertec's peripheral products operations are shipping proportionately higher quantities of lower margin disk drive products in relation to tape drive products. Other areas of business within the company are essentially meeting our expectations," he added.

Datapoint Reports Sales For Nine Months Up 56.6%

SAN ANTONIO, Texas — Datapoint Corp. reported nine-month revenues of $114.5 million, an increase of 56.6% over sales of $73.1 million reported for the comparable period in fiscal 1977.

Net earnings for the nine-month period ended April 30 were $10.4 million or $2.95 a share compared with earnings of $6 million or $1.84 per share for the same period a year ago.

Third-Quarter Earnings

Third-quarter unaudited earnings were $3.9 million or $1.08 a share on sales of $42.1 million compared with 1977 third-quarter earnings of $26.2 million or 60 cents per share.

The company reported that it changed the name of its Domestic Marketing Division to Data Processing Division to more accurately reflect the services it provides its customers.

Datapoint has also signed a letter of intent with General Dynamics Communications to establish a marketing relationship for Datapoint's Infoswitch product line. General Dynamics Communications will add Infoswitch to its current line of telecommunications products.

Data Terminal Sales Climb

MAYNARD, Mass. — First-quarter revenues for Data Terminal Systems, Inc. (DTS) bounded 69%, climbing to $13.6 million compared with revenues of $8.06 million a year ago.

Earnings for the first period were $2.5 million or 52 cents per share compared with $985,143 or 21 cents per share for the corresponding period a year ago.

Dr. Robert F. Collings, DTS president and founder, said that first-quarter performance reflected DTS' growing prominence as a manufacturer of stand-alone electronic cash registers and point-of-sale systems. "In the current fiscal year alone," he added, "we will release more than 10 new models."

Of particular interest is the Model 540 Scan-Alone, which the company claimed offers a 15,000-item price-look-up and UPC scanner without requiring a backroom computer.

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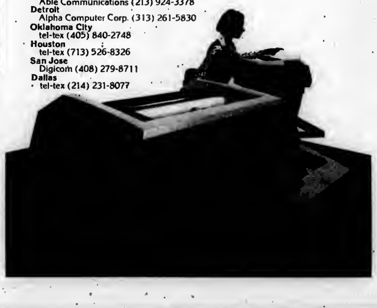

MSI Posts Records In Quarter and Year

COSTA MESA, Calif. — Donald F. Brosnan, president and chief operating officer of MSI Data Corp., said the company set records for the fourth quarter and the fiscal year ended March 25.

Fourth-quarter earnings rose to a new high of $988,649 or 48 cents a share, a 26% increase over the previous year's final quarter earnings of $753,704 or 38 cents a share.

Revenues in the quarter climbed to $10.4 million, up 21% from $8.6 million a year ago.

For the year, MSI posted earnings of $3.6 million or $1.80 a share, an increase of 29% over 1977 earnings of $2.7 million or $1.40 a share. Revenues for the year topped $38.8 million, up 13% from $34.2 million in the prior year.

Cognitronics in the Black

STAMFORD, Conn. — Cognitronics, Inc. reported unaudited earnings of $37,905 or 3 cents a share on sales of $1.3 million for the first quarter. Year-ago first-quarter revenues were $1.1 million with a loss of $62,434.

However, first-quarter earnings were boosted by a $15,000 carryforward for operating losses from prior years, the company noted.

David H. Shepard, president of Cognitronics, said the firm expects increased profitability, especially if anticipated deliveries to overseas markets can be made.

But, he observed, inflation and rising production costs pose a threat to earnings.

As Earnings Rise 11%

HP Quarter Revenues Gain 22%

PALO ALTO, Calif. — Hewlett-Packard Co. reported a 22% increase in revenues and an 11% increase in earnings for the second quarter.

Revenues for the quarter ended April 30 totaled $415.2 million, with earnings reaching $35.7 million or $1.23 a share. Revenues for the corresponding period a year ago were $341.6 million, with earnings totalling $32.1 million or $1.13 a share.

Net income was affected by a higher tax rate, which rose to 49.1% from 46.1% last year, HP noted.

On the brighter side, incoming orders during the six months were up 27% from a year ago, topping $881 million. International orders showed a gain of 32% during the first half of the fiscal year.

"International orders were higher than anticipated, reflecting continuing strength in key overseas areas," HP President John A. Young said, "which should have a beneficial effect on the company's performance in the second half."

Computer and calculator products accounted for 41% of the company's sales, the firm reported.

Revenues for the six months amounted to $783.4 million, a 22% increase over the first half of 1977. Earnings increased 17% to $68.2 million, equal to $2.37 a share. This compared with earnings of $58.2 million, equal to $2.06 a share, during the corresponding period last year.

Financial News

Inforex Results Steady in Quarter

BURLINGTON, Mass. — Inforex, Inc. has posted earnings for the first quarter of $474,000 or 14 cents a share on revenues of $15.5 million. Earnings for the corresponding period a year ago were $428,000 or 14 cents a share on revenues of $14.4 million.

The increased revenues were attributed primarily to higher third-party sales. Gross profit margins improved, rising to 51% of revenues from 47% because of the fuller amortization of systems rented or sold during the quarter, the company said.

Engineering and research and development expenses increased 41% over the same period a year ago, primarily for work on the System 7000, a spokesman noted.

Inforex Chairman T.C. Cronin said recent developments in two pending lawsuits have been favorable to Inforex. A treble damage suit for $12 million dollars instituted by a former employee was dismissed. A second suit involving a claim by the U.S. government that Inforex defaulted on a contract was remanded by the Court of Claims upon appeal to the Board of Contract Appeals of the General Services Administration for reconsideration.

Cronin also noted that orders in the aggregate were approximately 15% ahead of the first quarter of 1977, excluding a major order for an estimated 300 System 7000s that was received in February.

Dataproducts Hits Records

WOODLAND HILLS, Calif. — Dataproducts Corp.'s earnings and revenues for 1978 set records. At the end of the year March 25, the backlog stood at $70 million — 40% higher than a year ago.

Earnings of $15.5 million for the year were also 40% ahead of the previous year's results. Earnings per share reached $2.15 on sales of $138.6 million compared with $1.63 a share on revenues of $115.2 million a year ago.

Fourth-quarter earnings broke all previous quarter records, rising 40% to $4.3 million or 60 cents a share on revenues of $38.9 million. Fourth-quarter '77 results were $3.07 million or 43 cents a share on revenues of $30.3 million.

"During the year," Dataproducts President Graham Tyson noted, "the initial member of each of three new product families were introduced to expand the market sector Dataproducts serves."

The company recently declared a 50% increase in its semiannual dividend. The new amount, payable June 23, is 15 cents per share.

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(212) 682-6600
Company Inquiries Invited

PROGRAMMERS AND SYSTEMS ANALYSTS

Put Your Experience To Work For You In Building A Better Career Opportunity

Sperry Univac has a variety of challenging opportunities waiting for you at one of our Minneapolis locations. These openings exist within our Airline Industry Development Center which designs and supports software applications such as reservations, ticketing, cargo, departure control, message switching, check-in, hotel and fare quote. We are searching for candidates with 2+ years experience in ANY of the following disciplines:

- Design, implementation and support of real time applications
- Acceptance testing of application programs,
- Technical support in the customer environment
- Specific support of OS 1100/TIP/CMS

In addition to requiring experience within the areas mentioned above, it is also desirable to have a background in FORTRAN, and/or general UNIVAC 1100 series exposure.

We offer highly competitive starting salary, a comprehensive benefits program and outstanding professional and personal growth opportunities

FOR IMMEDIATE ATTENTION, PLEASE CALL COLLECT OR DIRECT YOUR RESUME TO: P.Y. PETERSON

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(612) 456-2309
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Data Processing

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At NASA's Slidell Computer Complex

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We seek qualified professionals for Univac 1100 series operating system maintenance and development. Work includes analyzing system arrors, developing specialized capabilities and generating and validating systoms. A degree in Math or applicable science is required.

PROGRAMMERS/ANALYSTS

Must havo a minimum of 2 years experienco in COBOL programming. Experience in Univac 1100 series is preferred. Large scale systoms experience essential. Degree in Math, Computer Science or oquivalent desired.

Liberal company benefits to include 2 weeks paid vacation, sick loave, 11 paid holidays, medical and life insurance for employee and pension plan. Call or send resume to:

SDC
Integrated Services, Inc.
1010 Gause Boulevard
Slidoll, Louisiana 70458
(504) 255-6374

We Are An Equal Opportunity Employer

System Development Corporation

SOFTWARE PROFESSIONALS

Immediate openings exist at our St. Louis headquarters for qualified software personnel.

Qualified candidates should have experience in SYSGENS. PTF application. problem determination. and assembler language coding.

Currently we are using the SVS operating system with HASP shared spool on 2 IBM system/370 model 158's. Future plans are to move to MVS and JES II. A BS degree is required and experience with MVS and CICS/VS is a definite plus.

We offer an excellent salary. comprehensive benefits and advancement based upon your accomplishments. Please send resume including salary requirements in confidence to:

Anheuser-Busch, Inc.

Manager. Salaried Employment
Department G-5
721 Pestalozzi
St. Louis. MO 63118

An Equal Opportunity
Employer M/F

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Bethesda, MO 20014
(301) 654-9225

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SMITH COLLEGE
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Is Accepting Applications for the Position of
Director of Academic Computing

The Director will have responsibility for administering and coordinating all academic computing activities including maintaining the existing user base and developing opportunities for computer use throughout the College curriculum. The Director will engage in long-term planning including the evaluation of hardware and software and the acquisition of a new computer. Present facilities include an IBM 1130, peripheral equipment, and time sharing arrangements with neighboring educational institutions.

Qualifications include a master's degree in Computer Science, recent extensive experience with hardware, operating systems and software, an understanding of computer application in an educational environment, a thorough knowledge of appropriate languages and the ability to communicate effectively with the academic community.

This new position reporting to the Dean of the Faculty is full time, twelve months, offers a starting salary range of $17,400 to $18,500 and liberal fringe benefits. Direct all applications before July 10, 1979 to Director of Personnel Services, Smith College, 30 Belmont Avenue, Northhampton, Massachusetts 01063.

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We are currently seeking an individual with preferably 3 to 5 years experience in FORTRAN and Assembly level programming, and a real-time interrupt driven environment. Experience with Mod-Comp II Mini Computer and design of data reduction systems desirable.

We offer a fine salary and excellent fringe benefit package. Interested persons should contact: Mr. Terry York, or forward their resume in complete confidence to:

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(505) 524-5223

equal opportunity employer m/f

BURROUGHS B-6700 STAFF EXPANSION

We are expanding our staff and require additional experienced personnel. Needed:

A systems programmer experienced in Espol, NOL, and Algol.

Several analyst/programmers for applications work requiring Cobol experience.

Salaries commensurate with experience level.

Resumes should be mailed to:
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Spartanburg, S.C. 29304

SYSTEMS COORDINATOR FOR USER SERVICES
$15,000-$19,750 annually

The Southeast Regional Data Center, serving Florida International University and Florida Atlantic University, both member institutions of the State University System of Florida, is accepting applications for systems coordinator for user services. This position will be responsible for user education, long-range planning for the development of the external user base, and general user liaison. General requirements include a strong technical background, preferably in educational computing. Must be able to work independently, be people and service oriented, and be familiar with several major computer languages, computer hardware and data communications equipment. UNIVAC 1100 experience a definite plus. Specific requirements include a Bachelor's degree in a related field and extensive related experience, or a Master's degree and three (3) years of experience.

Forward inquiries, applications, and resumes no later than July 10, 1978 to:

Mr. Bill King, Associate Director, Southeast Regional Data Center, Florida International University, Tamiami Trail-PC 548, Miami, FL 33199.

An EOE/AA

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Will design program logic, write and debug programs and direct various programming functions. Must be experienced with IBM 370/145 DOS/VS Assembler language. CICS teleprocessing, ANS COBOL helpful.

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Will act as liaison with management and user departments - assisting with specifications, analysis and establishment of systems objectives. Also coordinate staff, systems, procedures required for project implementation. Degree plus solid applications experience.

Both positions require strong experience in IBM 370 hardware with **LIFE COMM** and/or **CFO** life insurance background helpful. Competitive salaries, excellent benefits, room for increasing responsibilities and advancement. Send resume with salary history to:

Director, Personnel Operations

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Due to planned growth, our Management Information Services Department, located in our World Headquarters facility has several key positions available.

- **SOFTWARE PROGRAMMER (internals)** - Must be experienced in OS/MVT, HASP. Assembler language skills required, MVS experience helpful.
- **IMS SOFTWARE SPECIALIST** - Minimum of two years IMS/VS DB/DC experience. Experience in IMS recovery procedures, gens, performance tuning required. Assembler, OS and/or VS internals would be beneficial.
- **MVS SOFTWARE PROGRAMMER** - Must be experienced in MVS internals and Assembler with desire to expand knowledge into IMS/VS.

These positions afford salary commensurate with experience and an outstanding benefit package including, but not limited to: Company Paid Health Insurance, Dental Plan, Investment Plan, Tuition Assistance, "FLEXTIME" etc. Send resume, including current salary, to:

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MIS Department
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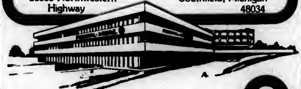
26555 Northwestern Highway
Southfield, Michigan 48034



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215-667-2400

DALLAS, TX
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LOS ANGELES, CA
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213-642-2482

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CONTROL DATA CYBERSEARCH INC

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others talk about it — we've got it

GROWTH

MINI-COMPUTER FIELD POSITIONS

With the V-77 series, Sperry Univac continues its dynamic growth in the mini-computer world! Become a part of that growth.

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Weigh these advantages:

- The best commission plan in the industry
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- Minimum 2 years mini-computer sales experience in the Data Base, Data Communications and/or Distributed processing marketplace
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- Record of maintaining account relationships.
- Ability to obtain new and repeat business.

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Key responsibilities in:

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Requirements:

- Technical degree desirable.
- Creative problem solver
- Minimum 2 years pre and/or post sales support.
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If you're a leading performer with your current company, don't pass up this opportunity to make a smart move.

You will find:

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- Room for advancement.
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call Dave Volz (collect) at (215) 542-2798,
or send your resume to P.O. Box 500, B-301M,
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call Al Sack (collect) at (714) 833-2400, Ext. 336,
or send your resume to G-5, 2722 Michelson Drive,
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SPERRY UNIVAC

MINI-COMPUTER OPERATIONS

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PROGRAMMERS/ SYSTEMS ANALYST

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A major Atlanta based company with a sophisticated Data Processing Training Program has an immediate opening for an imaginative professional who enjoys data processing. This individual must be technically strong, work well with people, and would enjoy being a course advisor in a leading edge state-of-the-art software development methodology training program.

We are seeking a Data Processing Training Analyst for an intensive student-paced study program. Substantial programming experience, and ability to communicate well, and a willingness to learn new ways of doing things are required. Systems Analysis experience and a Computer Science, Business or Engineering related degree are desired. Structured programming, structured design, etc. is a plus; but will train an otherwise qualified applicant.

We provide a competitive salary, comprehensive benefit package, and an excellent opportunity for advancement. Please send resume and salary requirements, in confidence, to:

Personnel Department
Southern Company Services, Inc.
P.O. Box 720071
Atlanta, GA 30346

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Southern Company Services

SENIOR SYSTEMS PROGRAMMER

SmithKline Clinical Laboratories is in the process of developing advanced information systems for our regional labs. We are seeking an experienced Senior Systems Programmer to become responsible for EDP technical support of our distributed megaminicomputers.

Knowledge of Data General Eclipse hardware, RDOS/INFOS Operating Systems and IDEA software plus strong COBOL base essential. The successful candidate will also be well-qualified in MUMPS/MIIS programming, telecommunications/network design, hardware evaluation, selection, optimization and data administration.

A degree in Computer Science or Engineering is required with Systems Engineering background a real plus. Travel to New England, Florida, St. Louis, Canada, and California. Salary $22K+, commensurate with background; excellent benefits package. Send resume in confidence to:

Stewart F. Plock, Director
Management Information Systems
SmithKline Clinical Laboratories
260 Sheridan Ave., Suite 310
Palo Alto, Calif. 94308

SKCL
a SmithKline service

PROGRAMMER/ ANALYST

Denver, Colorado

Samsonite Corporation has immediate need for a Programmer/Analyst who has manufacturing and financial systems experience.

If your background also includes COBOL, CICS, BAL, IIMS or other data base experience, Samsonite Corporation can offer you a rewarding career opportunity working in our teleprocessing environment. Your initial responsibilities will be in heavy applications programming, working into systems design and project leadership.

Systems analysis skills and project management experinace would be helpful.

We offer a competitive salary and benefits program which includes paid relocation. Please send your resume salary history and requirements to Patti Grinnell, SAMSONITE CORPORATION, 11200 E. 45th Ave., Denver, Colorado 80239. An Equal Opportunity Employer M/F.

COMPUTER PROGRAMMING PROFESSIONALS

Control Data Corporation has career growth opportunities in pre-sale, post-sale and consulting located throughout the United States.

APPLICATIONS

Applicants should have experience in one of the following areas:

- **Programmer/Design Analysts**
(Opportunities in Detroit, San Francisco Bay Area and Washington, D.C.).
Various levels are now open to candidates with one or more of the following:
  - COBOL, FORTRAN, BASIC
  - Interactive Information Systems
  - Quantitative Analysis
  - CDC 6600/7600, CYBER 70 or 170 series
  - IBM 370/360 OS, VS
- **Data Base Analysts**
(Opportunities in Detroit, Minneapolis, and Washington, D.C.)
  - COBOL, FORTRAN
  - Total System 2000 IMS SPSS
- **Software Develop,ent**
(Opportunities in Detroit, San Francisco Bay Area, and Washington, D.C.)
  - Requirements analysis
  - General and detailed design
  - Systems analysis
  - Project leadership
  - Information systems implementation
  - Knowledge of time sharing usage

OPERATING SYSTEMS

Applicants should have experience in maintaining, modifying or extending any one of the following operating systems:

- **CYBER 17X or 6000 with**
NOS, NOS/BE, SCOPE or KRONOS (Opportunities in Austin, A'buquerque, Boston, Chicago, Denver, Detroit, Fredericksburg, Livermore, New Jersey, Philadelphia, St. Louis, and San Francisco Bay Area).
- **System 370 or 360 with DOS**
(Opportunities in Albuquerque, Boston, Detroit, Milwaukee, Minneapolis, New York, Philadelphia, Pittsburgh, and Washington, DC)
- **CYBER 18**
with 1700 MSOS, RCOS or ITOS
(Opportunities in Dallas, Los Angeles, and Minneapolis)
- **PDP-11 with RSX-11M**
(These positions in the San Francisco Bay Area)
- **Intel 8080**
Or other microprocessors
(These positions in the Philadelphia Area).

or have extensive assembly language on any of the above computers.

For immediate consideration, please send resume, salary history and geographical preference to: John N. Powers at the address below

CONTROL DATA CORPORATION

An Affirmative Action Employer M/F

60 Hickory Dr., Waltham, Mass. 02154
OR CALL COLLECT:
(617) 890-4600, ext.245

Programmers-Analysts
Maximize your opportunities . . .

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OVERSEAS
ADVENTURE $40K+

IRAN

Applications programmer, Systems Engineer, H-6000 or L/66, GCOS/COBOL/GMAP IDS TPE/MULTICS, US firm has 18-24 mo tours w/fam. Ex financial pkg in Tehran. Ski 1 hr fm office. Rush resume: Cybermatrics Corp., P.O. Box 579, McLean, VA 22101. (703) 356-1997. Other positions avail. USA and Iran

---

Systems Analyst/ Programmer

Immediate opening for an experienced Systems Analyst/Programmer. This position carries major responsibilities in maintenance & upgrading of an information system, handling laboratory analysis & other technically oriented data.

Position requires:

- Six years of experience in Applications Programming
- College degree in Computer Science or Electrical Engineering
- Experience in Analysis & Design of Data Processing Systems
- Experience with IBM/370 & MVS
- Fluency in COBOL & IBM based JCL

Send Resume with salary history to:

THE COCA-COLA COMPANY
Department (1)
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Atlanta, GA 30301
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Public Service Company of New Mexico (PNM), located in mile-high Albuquerque at the foot of the Sandia Mountains, offers a comfortable year-round climate with easy access to skiing, hiking, camping and rich cultural activities.

PNM provides excellent benefit programs and salary structures for skilled professionals to participate in the analysis, design and installation of large State-of-the-Art business and engineering systems. Current software development projects include a materials management system, a customer service system, an employee information/payroll system and a project management information system.

Programmer/Analysts

Top quality FORTRAN or COBOL Programmer/Analysts are required for new systems development and installation. On-line and data base experience a plus.

Systems Analysts

Experienced Analysts required for challenging assignments in the development of large business and engineering systems. Project management experience a plus.

Methods and Procedures Analysts

Excellent writing skills required for the design and documentation of manual systems which interface with automated systems.

PNM's IBM S-370, 3031 with 2 Megs, MVS, CICS, IMS and TSO will be delivered January, 1979. PNM's hardware also includes an HIS 66/40 with 384K words, GCOS, TDS, IDS, TSS and MDQS.

To find out more about how you can join our progressive utility in the beautiful, Rocky Mountain Southwest, send your resume with salary history to:

Personnel Department
Public Service Company of New Mexico
P.O. Box 2267
Albuquerque, NM 87103
We are an equal opportunity employer

LIVE IN OREGON

Immediate openings for programmers/analysts to develop new online systems. Experience desired in FORTRAN, Hewlett-Packard 21MX computers and RTE-III operating system. Opportunity to join growth-oriented company in beautiful small city. Profit sharing and all the other fringes.

APPLIED THEORY ASSOCIATES
150 NW Lewisburg Rd.
Corvallis, OR 97330

OPERATING SYSTEMS MANAGER

Supervises the generation of operating system's, job entry subsystem and conversational remote job entry subsystem of a major computer installation (360/370 Systems). Configures hardware and software including telecommunications services to assure continuous operations of computerized systems. Documents all operating system-related facilities. Supervises staff of professional programmers. Consults with customers and staff of Computer Network.

Qualfications: Bachelor's Degree, six years experience in data processing including a minimum of four years in systems programming. Experience with OS/VS, HASP, CICS/VS, and OS/MVT desirable. Resume should be sent to Beverly Mace, University of Nebraska, Computer Network, Box 688 Downtown Station Omaha Nebraska 68101, Equal Opportunity/Affirmative Action Employer.

FLORIDA!

SYSTEMS RESEARCH & DEVELOPMENT
MANUFACTURING - FINANCIAL - ENGINEERING

Dynamic Systems Development div. of a major manufacturing co. is expanding its resources for the express purpose of future systems development. Selected individuals will possess a superior knowledge of one or more of the specified disciplines (Manufacturing, Financial, or Engineering Systems) plus a demonstrated ability in Systems Analysis & Design. Experience with large scale, data base oriented systems preferred. Knldg. of available software packages and ability to evaluate their usage is helpful.

MANUFACTURING *Sr. Systems Analysts (hi $20's+) & Systems Analysts (mid $20's+) Positions involve Analysis, Design, Development of Mfg. Systems, User Support, require no programming, and offer opportunity for light travel.*
FINANCIAL *Sr. Systems Analysts (hi $20's+) & Systems Analysts (mid $20's+) Positions involve Analysis, Design, Development of Financial Systems, User Support, require no programming, and offer opportunity for light travel. Experience with large CPA companies desirable.*
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Comprehensive benefit pkg. offered plus all expenses paid by client co.

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The dynamic and rapid acceptance of UNITED's CAD/CAM systems in the areas of 3D Mechanical Design/Drafting, Construction, Electrinical, Circuit Layout and N/C tape Preparation has created a demand for immediate expansion of our sales team.

THE JOB

It's not an easy job. It takes a special type of Sales Engineer. The type of individual who knows the ins and outs of Engineering or Manufacturing methods as well as the whos, whys and wheres relating to "state-of-the-art" CAD/CAM systems and how they can be used advantageously.

THE PERSON

Our professional Sales Engineer will be systems oriented with a degree (technical degree preferred) or equivalent technical experience and have at least 3 years successful sales experience in any of the fields of Engineering, Manufacturing, N/C, CAD/CAM, Machine Tools/Supplies or Mini-computers.

THE REWARD

If you're the Sales Engineer that fits the description we are prepared to offer you one of the finest compensation packages. This includes an excellent salary plus generous commission and plenty of growth potential. We also have a complete benefits package including fully paid medical, dental and group insurance. We expect you to earn over $35,000 in your first year.

Openings exist in the following areas:

- **Chicago**
- **Milwaukee**
- **Minneapolis**
- **Cleveland**
- **Boston**

If you feel that you meet our qualifications and are interested in moving forward into a challenging career with a prominent organization, call COLLECT NOW or send your detailed resume including salary/earnings history so that we may arrange a personal local interview in your area soon.

Mr. Bob Schaal (213) 830-7720

22500 So. Avalon Blvd., Carson, California 90745

***UNITED* Computing Corporation**

A Subsidiary of McDonnell Douglas Automation Company
An Equal Opportunity M/F Employer

MCDONNELL DOUGLAS
CORPORATION

SYSTEMS PROJECT MANAGER & SYSTEMS ANALYST

Hanes beautymist. May Queen
Todays girl. Underalls Slenderalls

Hanes Hosiery Manufacturer of:

Hanes Hosiery, a division of Hanes Corporation – a Fortune 500 Company with Headquarters in Winston-Salem, N.C. – has openings for systems planning and development personnel.

These positions require significant experience in a large scale installation, utilizing on-line systems, transaction processing software, and data base management. You will have the opportunity to participate with a top staff of EDP professionals in the continued development of sophisticated systems. Our company is committed to maintaining a position of leadership in EDP utilization and these positions accordingly offer excellent opportunity for professional growth.

SYSTEM PROJECT MANAGER

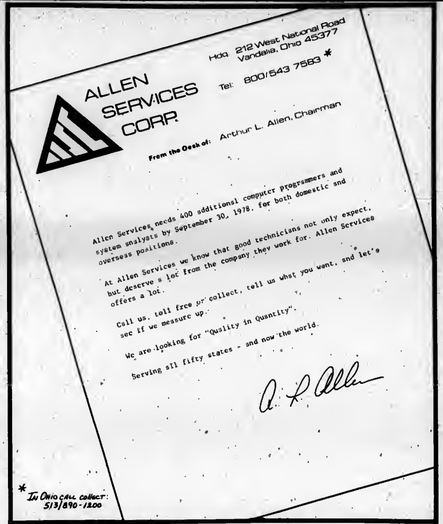
Candidate should have a college degree and a minimum of 3 years experience as a systems analyst with overall responsibility on major projects. Will function as manager of systems development and maintenance activities for a group of functional areas.

SYSTEMS ANALYST

Candidate should have a minimum of 4 years total DP experience and at least 1 year as a systems analyst.

If you feel that you qualify, please send resume including salary data in confidence to:

MANAGEMENT RECRUITMENT COORDINATOR
HANES HOSIERY
P.O. Box 1413
Winston-Salem, N.C. 27102
Affirmative Action Employer



ALLEN SERVICES CORP.

Hdq: 212 West National Road
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Tel: 800/543 7583 *

From the Desk of: Arthur L. Allen, Chairman

Allen Services needs 400 additional computer programmers and system analysts by September 30, 1978, for both domestic and overseas positions.

At Allen Services we know that good technicians not only expect, but deserve a lot from the company they work for. Allen Services offers a lot.

Call us, toll free or collect, tell us what you want, and let's see if we measure up.

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Faculty Position:

Physics and Computer Science, Murray State University

Qualifications: Ph.D. in Computer Science or related field. Teaching and industrial experience desirable. The successful candidate will be expected to teach courses in areas of programming language and operating systems. Rank and salary dependent upon qualifications and experience.

Send application, resume, three confidential letters of reference, undergraduate and graduate transcripts to: Dr. Robert C. Etherton, P.O. Box 2109, University Station, Murray, Kentucky 42071.

Applications received after July 15, 1978 may not be considered.

Murray State University is an Equal Opportunity Employer, M/F and encourages applications from all qualified persons.

What price, Gloria?

If you and Gloria and Hal and Heather don't know the price for your services in today's active job market for computer professionals, you could all be at a serious disadvantage.

It's always important to know the job market and your own marketability . . . even if you're not actively looking now.

- You'll be in a position to assess and take advantage of an important career opportunity when it develops.
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You can find out IN COMPLETE CONFIDENCE how marketable you are. We operate with clients and candidates nationally. Call or mail your resume to:

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617/235-5663, 617/872-3577

Our client companies assume all fees and pay interview and relocation expenses.

ASSISTANT DIRECTOR TECHNICAL OPERATIONS

The successful applicant will be responsible for maintaining and enhancing the Commonwealth's automated merit rating system. This responsibility will include

- recruiting and supervising a small staff of analysts/programmers
- interacting on a frequent basis with Registry of Motor Vehicle Computer Center personnel
- supervising consultants and assisting in contract negotiations
- providing technical advice and assistance to the insurance industry

Candidates should have experience in COBOL programming, systems analysis, the implementation, operation, and management of a computerized system, and knowledge of key-to-tape data entry equipment.

Salary: $18,000 - $22,500. Hardware: The Registry of Motor Vehicles' CDC 3300 Computer.

Applicants must send a letter of application and a resume (including recent salary history) to Director, Merit Rating Board, 150 Causeway Street, Room 315, Boston, Ma. 02114,

The Merit Rating Board is an equal opportunity employer.

EDP Professionals

As a major financial institution, located in New York City, we can offer opportunities for qualified individuals in our MIS area. We are seeking:

Internal Consultant
To $35,000

Responsible for planning and developing applications systems for the controllers department. Broad range responsibilities for all systems being planned in this area. Strong design and some programming experience is required as well as the ability to interface with senior management. This position can lead to a managers position in data processing or finance.

Hardware/Software Evaluator
To $33,000

Responsible for assisting management in planning, selecting and installing hardware/software. An excellent broad based background in large mainframes and mini computers is required. Additionally, strong consulting skills are a must.

Manager Teleprocessing
To $35,000

Responsible for the design and installation of a real time communications network. The ideal person will be able to move onto top level management within the MIS area. Knowledge of OS internals, communications monitors and some data base experience is required.

Data Security Administrator
To $36,000

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- *UNIVAC 1100 DMS, TIP
- *CICS COBOL or BAL
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Please send resume to: Informatics PMI, 1121 San Antonio Rd., Palo Alto, CA 94303, Attn: Lois Flury; or telephone Lois Flury at (206) 385-0387 or (415) 964-9900 for additional information.

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Applicant should possess a background in, or knowledge of, Electric Utility Power Operation and be experienced in Assembly, Fortran and other computer languages.

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COMPUTER CENTER POSITIONS

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Bachelor's level degree and an academic discipline. Minimum 3 years of experience in design and programming of large scale data systems; proven ability for independent development using COBOL language.

Academic Computing Applications Specialist ...... up to $22,000
Procures and implements large scale program packages on the computer system for faculty use in teaching and research. Consults with faculty in order to provide assistance in the development of large scale programs for teaching and research. Offers professional level courses in computer technology as part of a "Faculty Training Program." Develops technical manuals for in-house use by the students and faculty.

M.S. degree or higher in an academic discipline. Minimum 10 years of academic programming applications development experience using several of the commonly used languages such as: FORTRAN, BASIC COBOL, Assembler, APL, ALGOL, PL/1, etc. Experience in interfacing with faculty and students for solving their computer applications problems is essential. Please send resume along with your salary history to:

Dr. S.C. Mathur, Director, Computer Center
UNIVERSITY OF LOWELL
Lowell, MA 01854

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A major corporation in Pittsburgh seeks a qualified professional to fill a newly created position in the Telecommunications department. This position requires knowledge and understanding of a number of cross-disciplines - including Hardware, Software, and Data Communications. The successful candidate should be familiar with Voice-Transmission techniques and Digital Communications as well as have the capability of developing a Micro-Processor. The incumbent should possess an analytical ability as well as be able to work well with people. A Bachelor's degree in engineering or related area is required unless the individual possesses sufficient experience directly related to this field. Mail your resume including salary requirements to:

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EDITOR

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The editor should have one of the following education/experience mixes:

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The editor will be responsible for planning each issue, "recruiting" material from HP customers, reviewing articles for style and referring them to appropriate experts for technical accuracy. The editor will work closely with product marketing managers in planning articles, but will have a high degree of independence in exercising final judgment.

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IBM OS
Programmer/Analysts

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Desirable Characteristics:

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Closing Date for Receipt of Application: July 7, 1978

Contact:

Richard E. Slocum, Selection Advisory Committee
Bryan Hall, Room 7, Indiana University, Bloomington,
Indiana 47401. Phone (812) 337-1053

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Information Systems Manager reporting to Dean's Office, School of Medicine. Advise regarding data base systems, software requirements, and hardware evaluation. Develop and maintain systems including faculty and student records, admissions, financial systems interfacing with university file.

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Analyst/ Programmer

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You should have a BA, BBA or BS in Computer Sciences with in-depth experience in Systems Design and Programming (preferably in a manufacturing environment) and a working knowledge of MRP, Inventory and Shop Floor Control. Competency in ANS COBOL programming on Disk oriented IBM 360/370 computer a MUST. Experience with DBOMP Software and CRT Systems desirable.

We offer excellent growth potential. Salary commensurate with experience and qualications plus liberal fringe benefits. Greensboro is ideally situated in the Piedmont area of North Carolina and affords excellent educational and recreational facilities. For consideration, please send a complete resume, in confidence to: Ms. Sharon Everhart, Employee Relations Department, Gilbarco, P.O. Box 22087, Greensboro, N.C. 27420.

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Will evaluate software package, provide internal education and prepare programming and systems standards and procedures. Design, code, test document and maintain computer programs. Degree preferred plus minimum 3 years experience. Must know OS, JCL, and COBOL.

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Research, analyze, design and prepare system and program specifications. Implement and document systems and provide user education and assistance. Degree preferred plus minimum 3 years experience. Knowledgable in OS, JCL, and COBOL. Inventory control background a plus.

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senior education instructor

The Information Services Department of Baxter Travenol Laboratories, headquartered in Deerfield, Ill., is seeking a professional trainer for its systems and programming staff.

Applicant must have experience with and a fairly extensive knowledge of data processing using large scale computers and operating systems as well as current or prior college level teaching experience in business and computer science.

The position will involve responsibility for developing and presenting classes and/or seminars on a wide variety of business topics, developing improved techniques for the training of data processing professionals (using multi-media facilities) and assisting in the career development activities of data processing professionals.

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DIRECTOR AND DEPUTY DIRECTOR OF DATA PROCESSING

Department of Human Services
State of New Jersey

The Department of Human Services is a social services umbrella agency with approximately 22,000 employees comprised of seven divisions with an annual administrative budget of 400 million dollars.

The Department Data Center has recently acquired a large-scale dual mainframe installation with extensive random access storage and a telecommunications configuration (both hardware and software) which will support up to 400 on-line terminals.

To manage this sophisticated installation, we are looking for the following people:

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Salary Range: high twenties to high thirties. Educational Requirement: Bachelor's degree in Accounting, business administration, engineering or basic science areas required. Master's degree desirable. Experience: Minimum of ten years experience in a data processing installation which shall have included the planning, installation, operation and revision of data processing programs, systems and equipment. Must have a broad management background including data processing management experience, understand current issues and future trends of this technical field, have a service philosophy and be able to instill it in others.

DEPUTY DIRECTOR OF DATA PROCESSING

Salary Range: Mid-twenties to mid-thirties. Educational Requirement: Bachelor's degree in financial, business administration, engineering or science areas required. Master's degree desirable. Experience: Minimum of eight years experience in a data processing installation which shall have included the planning, installation, operation and revision of data processing programs, systems and equipment. The person in this position will act as the Director's alter ego in the running of the Data Center. This person shall have had management responsibility in data processing administration as well as a knowledge of teleprocessing and data base techniques.

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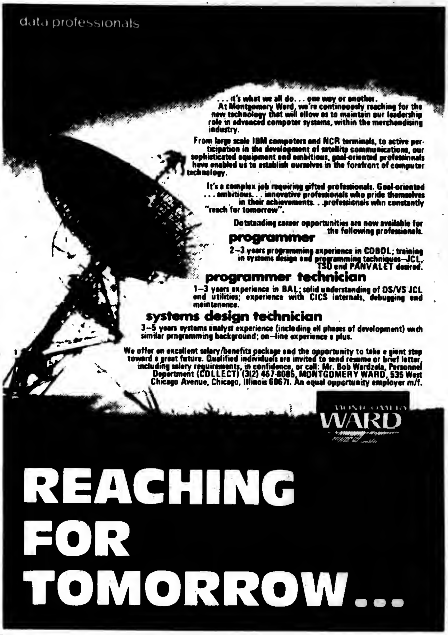

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Northwest and Alaska

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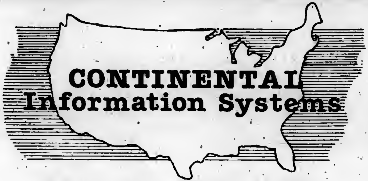

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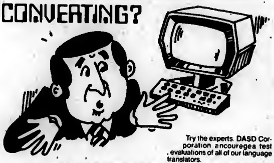

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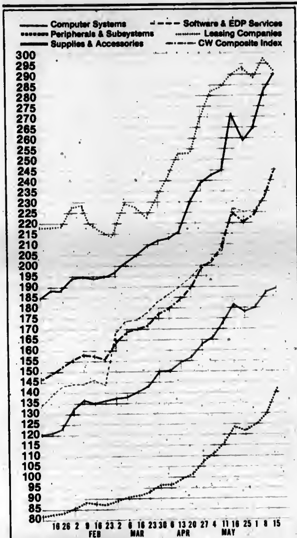

Earnings Reports

SYKES DATATRONICS

Year Ended Feb. 28

	1978	1977
Shr Ernd	$.52	$.17
Revenue	5,008,000	3,811,000
Tax Cred	153,000	66,000
Earnings	495,000	160,000

TEC

Three Months Ended March 31

	1978	1977
Shr Ernd	$.30	$.27
Revenue	3,693,043	2,853,370
Earnings	245,236	220,217
6 Mo Shr	.87	.97
Revenue	6,488,148	6,586,858
Earnings	550,202	710,547

TELERENT LEASING

Three Months Ended March 31

	1978	1977
Shr Ernd	$.25	a$.24
Revenue	2,662,000	2,371,000
Earnings	361,624	342,327
6 Mo Shr	.52	a.42
Revenue	5,098,000	4,750,000
Earnings	759,384	619,036

a-Adjusted for a 5% stock dividend paid in March 1978.

TYMSHARE

Three Months Ended March 31

	1978	1977
Shr Ernd	$.75	$.60
Revenue	36,075,985	26,235,333
Earnings	3,381,245	2,621,262

COMMODORE

Three Months Ended March 31

	1978	1977
Shr Ernd	$.02	$.04
Revenue	8,888,000	4,957,000
Tax Cred	125,000	....
Earnings	250,000	96,000
9 Mo Shr	.10	1.18
Revenue	20,143,000	15,426,000
Tax Cred	468,000	....
aSpec Cred	....	3,075,000
Earnings	936,000	2,910,000

a-Gain from settlement of creditor liabilities under Chapter 11 bankruptcy proceedings.

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TRADE QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, JUNE 14, 1978

All statistics compiled, computed and formatted by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		PRICE 1977-78 RANGE (1)	CLOSE JUN 14 1978	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMDAHL CORP	22- 39	38 3/4	+2 1/2	+6.8
N	BURROUGHS CORP	55- 91	77	+ 7/8	+1.1
C	COMPUTER AUTOMATION	18- 38	37 1/2	+1 1/4	+3.4
N	CONTROL DATA CORP	20- 36	35 1/2	+ 1/8	+0.3
C	CRAY RESEARCH INC	15- 46	38 1/2	0	0.0
N	DATA GENERAL CORP	35- 61	60 1/4	+ 1/2	+0.8
N	DATAPOINT CORP	18- 64	64 1/4	+3 3/8	+5.5
N	DIGITAL EQUIPMENT	37- 53	52 1/4	+ 5/8	+1.2
N	ELECTRONIC ASSOC.	2- 8	7 3/8	-1	-11.9
A	ELECTRONIC ENGINEER.	8- 19	19 1/8	+2 1/8	+12.5
O	FOUR-PHASE SYSTEMS	13- 32	31 7/8	+ 1/4	+0.7
A	FOXBORO	28- 54	38 5/8	- 1/8	-0.3
C	GENERAL AUTOMATION	6- 19	18 1/2	+1 3/8	+8.0
O	GRI COMPUTER CORP	1- 1	1 5/8	+ 1/4	+18.1
N	HEWLETT-PACKARD CO	62- 87	83 3/4	- 1/8	-0.1
N	HONEYWELL INC	43- 59	57 3/4	- 7/8	-1.4
N	IBM	236-286	271 1/8	+5 7/8	+2.2
C	MANAGEMENT ASSIST	5- 18	16 1/8	-1 1/4	-7.1
O	MICRODATA CORP	7- 18	16 3/4	+ 5/8	+3.8
C	MINI-COMPUTER SYST	5- 12	5 3/4	-1 1/4	-17.8
C	MODULAR COMPUTER SYS	5- 15	14 1/8	- 1/4	-1.7
N	NCR	32- 58	56 5/8	- 1/2	-0.8
C	PRIME COMPUTER INC	12- 31	31 1/4	+7 3/4	+32.9
N	PERKIN-ELMER	17- 26	25	- 1/4	-0.9
N	RAYTHEON CO	16- 50	49 3/8	- 1/2	-1.0
N	SPERRY RAND	30- 45	43 5/8	0	0.0
C	SYCOR INC	8- 24	23 5/8	- 3/8	-1.3
A	SYSTEMS ENG. LABS	5- 21	20 1/4	+1 3/8	+7.2
A	WANG LABS.	10- 26	26 1/8	+2 7/8	+12.3

LEASING COMPANIES

EXCH		PRICE 1977-78 RANGE (1)	CLOSE JUN 14 1978	WEEK NET CHNGE	WEEK PCT CHNGE
C	ALANTHUS CORP	3- 6	5 1/8	- 1/2	-8.8
C	BOOTHE COURIER CORP	8- 18	16 1/2	- 3/8	-2.2
C	COMDISCO INC	9- 20	18 1/2	-1	-5.1
A	COMMERCE GROUP CORP	1- 3	5/8	0	0.0
A	COMPUTER INVSTRS GRP	1- 2	1 1/8	+ 1/8	+12.5
M	DATRONIC RENTAL	0- 2	1 5/8	0	0.0
A	DCL INC	1- 4	3 1/2	- 1/8	-3.4
N	DPF INC	6- 13	12 3/8	- 1/4	-1.9
N	ITEL	13- 27	26	+ 3/8	+1.4
N	LEASCO CORP	19- 35	31	-2 5/8	-7.8
C	LEASPAC CORP	1- 2	1 3/4	0	0.0
A	PIONEER TEX CORP	5- 11	6 5/8	- 1/4	-3.6
N	U.S. LEASING	10- 16	15	- 1/4	-1.6

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

EXCH		PRICE 1977-78 RANGE (1)	CLOSE JUN 14 1978	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	0- 2	1 3/8	+ 1/8	+10.0
O	ANACOMP INC	7- 16	16	+2	+14.2
A	APPLIED DATA RES.	5- 16	15 7/8	+2 3/8	+17.5
N	AUTOMATIC DATA PROC	23- 34	33	- 1/8	-0.3
O	COLEMAN AMERICAN COS	1- 2	1 3/4	+ 1/4	+16.6
C	COMPU-SERV NETWORK	7- 15	9	- 1/2	-5.2
O	COMP ELECTION SYSTMS	6- 10	9	0	0.0
C	COMPUTER HORIZONS	1- 4	4	+ 1/4	+6.6
O	COMPUTER NETWORK	6- 12	11 5/8	+ 7/8	+8.1
N	COMPUTER SCIENCES	7- 13	12 1/2	+ 1/2	+4.1
O	COMPUTER TASK GROUP	1- 4	3 1/4	+ 1/4	+8.3
O	COMPUTER USAGE	1- 4	2 7/8	- 3/8	-11.5
C	COMSHARE	5- 17	16	+ 3/4	+4.9
C	DATA DIMENSIONS INC	3- 7	6 1/2	+ 7/8	+15.5
O	DATATAB	1- 2	1	0	0.0
N	ELECTRONIC DATA SYS.	14- 23	20 1/2	- 1/4	-1.2
O	INSYTE CORP	2- 3	1 3/8	+ 3/8	+37.5
C	IPS COMPUTER MARKET.	1- 2	2 3/8	+ 1/8	+5.5
O	KEANE ASSOCIATES	3- 6	6	+ 1/8	+2.1
C	KEYDATA CORP	1- 3	2 1/4	+ 3/8	+20.0
A	LOGICON	7- 17	12 3/4	+1	+8.5
A	MANAGEMENT DATA	1- 2	1 1/8	0	0.0
A	NATIONAL CSS INC	10- 28	28	+ 3/4	+2.7
O	NATIONAL DATA CORP	4- 12	11 3/8	- 1/8	-1.0
A	ON LINE SYSTEMS INC	16- 26	24 3/8	- 5/8	-2.5
N	PLANNING RESEARCH	3- 8	8	+1 1/4	+18.5
O	PROGRAMMING & SYS	1- 1	3/4	0	0.0
O	RAPIDATA INC	2- 6	5 7/8	+ 3/8	+6.8
C	REYNOLDS & REYNOLDS	17- 27	27 1/4	+ 3/4	+2.8
C	SCIENTIFIC COMPUTERS	1- 6	5 3/8	+ 1/4	+4.8
O	TYMSHARE INC	14- 27	25 3/4	-1 5/8	-5.9
A	URS SYSTEMS	4- 7	6 3/4	+ 5/8	+10.2
N	WYLY CORP	1- 5	4 1/8	- 5/8	-13.1

PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1977-78 RANGE (1)	CLOSE JUN 14 1978	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	10- 25	24 1/4	0	0.0
C	ADVANCED MEMORY SYS	7- 14	13 5/8	+ 1/2	+3.8
N	AMPEX CORP	8- 17	15 7/8	- 7/8	-5.2
C	ANDERSON JACOBSON	3- 9	7 3/4	- 3/4	-8.8
N	APPLIED DIG DATA SYS	10- 20	17 1/2	+1 1/8	+6.8
N	BEEHIVE INT'L	5- 12	6 3/4	+ 5/8	+10.2
A	BOLT,BERANEK & NEW	6- 11	10	+1	+11.1
N	BUNKER-RAMO	8- 18	18 1/8	+ 1/4	+1.3
A	CALCOMP	3- 9	8	- 1/2	-5.8
C	CAMBRIDGE MEMORIES	1- 8	6 5/8	-1	-13.1
N	CENTRONICS DATA COMP	16- 30	28 1/4	+1 5/8	+6.1
C	COGNITRONICS	1- 4	4 3/8	+2 1/4	+105.8
O	COMPUTER COMMUN.	5- 10	9 3/8	+ 3/8	+4.1
C	COMPUTER CONSOLES	4- 9	8 3/4	+1	+12.9
A	COMPUTER EQUIPMENT	2- 6	5	- 1/8	-2.4
C	COMPUTER TRANSCEIVER	1- 1	1 5/8	+ 1/4	+18.1
C	COMTEN	9- 28	27	- 1/2	-1.8
N	CONRAC CORP	19- 28	23 3/8	0	0.0
C	DATA ACCESS SYSTEMS	4- 5	5 1/4	+ 3/4	+16.6
O	DATA 100	6- 17	15 1/4	- 3/8	-2.3
A	DATA PRODUCTS CORP	9- 24	23 1/4	+2 1/2	+12.0
O	DATA TECHNOLOGY	3- 4	4	0	0.0
O	DATUM INC	1- 4	4	0	0.0
O	DECISION DATA COMPUT	2- 4	4 1/4	+1 3/8	+47.8
O	DELTA DATA SYSTEMS	1- 1	5/8	+ 1/8	+25.0
A	DOCUMATION INC	6- 22	22 1/4	+3	+15.5
C	DATARAM CORP	2- 24	21 3/4	+ 1/2	+2.3
N	ELECTRONIC M & M	4- 7	6 7/8	- 1/8	-1.7
O	FABRI-TEK	1- 2	1 5/8	+ 1/4	+18.1
O	GENERAL COMPUTER SYS	0- 2	1 3/4	+ 3/8	+27.2
N	HAZELTINE CORP	8- 16	15 1/2	+1 1/4	+8.7
N	HARRIS CORP	28- 61	59 1/4	- 1/2	-0.8
C	INFOREX INC	4- 10	9 5/8	0	0.0
O	INFORMATION INTL INC	8- 14	9 1/4	+ 1/2	+5.7
O	INTEL CORP	38- 62	60	-1	-1.6
A	LUNDY ELECTRONICS	3- 6	3	0	0.0
O	MSI DATA CORP	6- 19	18	+ 1/8	+0.6
N	MEMOREX	23- 49	45 3/4	-1 1/2	-3.1
N	MOHAWK DATA SCI	5- 12	11 1/8	- 1/8	-1.1
C	PENRIL CORP	7- 9	12 1/4	+2 3/8	+24.0
N	PERTEC CORP	7- 14	11 7/8	+ 1/4	+2.1
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
C	PRECISION INST.	2- 2	2	0	0.0
O	QUANTOR CORP	3- 5	2 7/8	- 1/8	-4.1
L	RECOGNITION EQUIP	6- 12	12 1/8	+3	+32.8
C	SCAN DATA	1- 4	3 1/4	0	0.0
N	STORAGE TECHNOLOGY	10- 46	46 1/4	+7 3/4	+20.1
O	T BAR INC	7- 19	17 1/2	+1 1/2	+9.3
O	TALLY CORP.	4- 9	8 1/2	+1	+13.3
A	TEC INC	6- 10	10 1/8	+2 3/4	+37.2
N	TEKTRONIX INC	29- 45	43 3/4	- 7/8	-1.9
N	TELEX	2- 7	6 1/4	+ 3/8	+6.3
C	TESDATA SYSTEMS CP	13- 20	18 3/4	- 3/4	-3.8
O	WILTEK INC.	1- 1	1 3/8	+ 1/4	+22.2

SUPPLIES & ACCESSORIES

EXCH		PRICE 1977-78 RANGE (1)	CLOSE JUN 14 1978	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMERICAN BUS PRODS	6- 9	9	+ 5/8	+7.4
C	BALTIMORE BUS FORMS	1- 5	4 1/2	0	0.0
A	BARRY WRIGHT	10- 28	26 1/8	0	0.0
C	CYBERMATICS INC	1- 1	1 1/4	+ 1/8	+11.1
C	DUPLEX PRODUCTS INC	14- 27	26 1/8	+2 3/8	+10.0
N	ENNIS BUS. FORMS	6- 17	15 7/8	- 1/2	-3.0
N	3M COMPANY	43- 57	56 3/8	- 3/8	-0.6
O	MOORE CORP LTD	24- 37	32 3/4	- 3/4	-2.2
N	NASHUA CORP	16- 31	29	-1 3/4	-5.6
C	STANDARD REGISTER	18- 26	22 1/4	-2 1/4	-9.1
A	TAB PRODUCTS CO	9- 13	11 3/8	+ 3/8	+3.4
N	UARCO	15- 27	25	+ 5/8	+2.5
A	WABASH MAGNETICS	13- 15	13 7/8	- 3/8	-2.6
N	WALLACE BUS FORMS	17- 25	24 3/4	+ 1/8	+0.5

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